The Chemical Age

VOL LXIII 22 JULY 1950 No 1619

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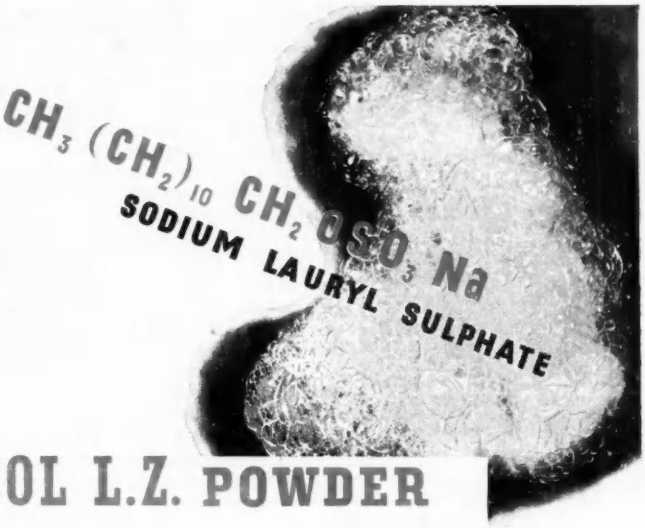

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New Fields for Phosphorus

PHOSPHORUS in elemental form has not been regarded as a major industrial chemical. Even in the match industry it had a chequered history. Industry's interest has largely been expressed in terms of phosphates and occasionally other combined forms, and for most processing phosphoric acid or one of the phosphates have usually been considered adequate. This background is rapidly changing, particularly in the United States. Elemental phosphorus rather than phosphoric acid is increasingly playing the key part. The recent news that a phosphorus plant costing £1 million is to be built in Britain (THE CHEMICAL AGE, *63*, 9) and will be the largest in the United Kingdom appears to recognise this development.

The major raw material source of phosphorus and its compounds is mineral rock phosphate, of which there are many large deposits around the world. This is generally a complex form of calcium phosphate into which other elements, notably fluorine, have entered by geological infiltration. To make this material "active" or "chemically convertible," de-fluorination and simplification of the molecular structure are required, and this has largely been achieved by acid treatment, of which the well-known fertiliser process for superphosphate is the foremost example. Alternatives are the high temperature fusion treatments, which have been much less used. Once a simpler calcium phosphate material has been obtained, further refinement can produce soluble phosphates. For fertiliser purposes cruder material containing known proportions of soluble phosphate are sufficient.

Readers of American chemical publications in the past decade might often have supposed that the Tennessee Valley Authority was backing a wild horse in making phosphoric acid by first producing elementary phosphorus in electric furnaces. It was commonly believed that this new path to phosphoric acid was made economically possible only because TVA developments were aided by State funds. This criticism is still made by some other fertiliser producers in America. More significant, however, is the fact that chemical companies in the United States are rapidly adopting the electric furnace method, and the older acid or wet-process methods of converting rock phosphate into phosphoric acid

On Other Pages

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are losing ground, except perhaps in fertiliser production where low price economics and only rough purity standards prevail. But even in this field it is an open question whether the electric furnace method would not be the best route to higher-analysis phosphatic fertilisers, ammonium phosphate, triple or double superphosphate. Where electric power is cheap and abundant the case for the TVA electric method is attractive.

In 1944 American production of elemental phosphorus was at its wartime peak, about 85,000 tons; two years later it had dropped slightly to 80,000 tons. But a recent estimate for 1949 shows that 116,000 tons had been made, and current U.S. expansion plans show that a plant capacity for making 160,000 tons per year will soon be reached. Previous producers are erecting more furnaces and new producers are entering the market. Elemental phosphorus itself is rarely required as an end-product; most of it is converted into phosphoric acid for the further manufacture of a range of phosphates, while something like 7 per cent of the total tonnage of phosphorus is converted into the pentoxide, oxychloride, chlorides, or sulphides.

New demands for phosphorus compounds in a fairly pure state account for this remarkable expansion. One of the most striking is in soap and detergent manufacture. In the United States at least 18 per cent of the elemental phosphorus now produced is required for conversion into phosphates for soap or detergents. The paradox is that soapless detergents should have made less headway in a soap-rationed country, which Britain has been since 1942, than in the United States. That, however, will probably not continue indefinitely. Some experts believe that eventually the modern detergent will become almost as widely accepted here, and the existence of numerous hard-water areas of Britain lends support to this belief.

Another increasing use of phosphorus chemicals is in the production of plastics and surface coatings, especially for metal surface protection. Phosphate esters are required in substantial amounts as plasticisers for vinyl resins; American expansion in this one use is estimated at 200 per cent since 1946. Phosphates are increasingly used as anti-rust and anti-corrosion coatings. A smaller but possibly significant new use is in the production of the several new organo-phosphorus in-

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Notes and Comments

German Exports

LITTLE remains in July 1950 to recall the desperate competition for greater goals than the export markets waged not long ago between Britain and Germany and her neighbours. Thankfulness that there is now little to conjure up memories of those war industries beyond the infrequent BIOS final report has not entirely obscured the knowledge that a peaceable Western Germany—which last week welcomed with warm and expert hospitality visitors from all over the world to witness at Frankfurt its advances in chemical engineering—is still potentially formidable. Against the threat represented by the offer of chemicals, plant and technical products at prices lower than this country and most others can quote there can be no collective defence. The price factor, which now seems to have won for the German coal industry the former British trade with Holland, is, however, not the only weapon, nor perhaps the most potent as some observers have noted at the German chemical engineers' exhibition this week. The plant at the ACHEMA is commanding interest not only because of the fruitful inventiveness in using in new ways as structural materials such things as unplasticised PVC, graphite and plated steels. Nearly all these plant items can be supplied without the delays which are coming to be regarded as normal procedure here. The impression is given that German chemical engineers and instrument makers have all the special steels and similar "scarce" materials their industry can use, and no heavy home demand impedes the export drive.

Dangerous Chemicals

THE safe conveyance of potentially dangerous goods is a comparatively neglected problem whose proportions have increased in a more or less direct ratio with the widening of industrial chemical methods. Chemical industry has no monopoly of hazardous substances, but its newer products very often come within that category. The material which "exploded" on a lorry, injuring 14 people at Kensworth, Bedfordshire, last month, Ferrolene, has a flash-point of −20° C. It appears that some of the liquid—which, in its vapour form, mixed with coal gas, provides a very effective flame cutter—escaped from a drum and dropped on the hot exhaust pipe. This and a number of other cases emphasise the need to revise the control regulations covering the transport and special packaging of hazardous products. While there exists a series of provisions covering movement by rail, most of these were formulated about 1900, since when a number of chemical products then only in the laboratory stage, have become familiar commercial materials. Some of these have low flash points and other hazardous properties which call for reconsideration of the safeguards which used to be adequate. As far as road transport in concerned, apart from petroleum products and explosives, no authoritative controls appear to exist to make the carriage of dangerous goods a safer business. Inquiries at the Home Office reveal that "the position is under review."

*p*H Standards

THE recent standard issued by the British Standards Institution (THE CHEMICAL AGE, *62*, 909) is designed to agree with that of the U.S. scientists E. R. Smith and R. G. Bates, whose work in this field led them to offer a system which would allow unified and co-ordinated reference methods. For several years the U.S. National Bureau of Standards has issued three materials as reference buffers for adjusting glass electrode *p*H meters to conform as closely as possible with the standard based on the formula—$\log_{10} aH$, where aH is the activity of hydrogen ion in the respective solutions. The interpretation of

*p*H numbers on the old system is complicated by imperfections in the method, caused by failure of the liquid-junction potential to maintain a constant value when the solution to be measured is replaced by the standard solution. At high dilution and high concentration and in solutions strongly acid or strongly alkaline this leads to serious errors, and the *p*H loses its exact fundamental meaning.

Truer Comparisons

THE values assigned to *p*H by the classical methods of Sorensen have been used for 30 years, but the unit of acidity thus determined is not directly related to chemical equilibrium, and further, scales of concentration are not easily compared by the use of galvanic cells. The choice of a new unit for expressing the degree of acidity of an aqueous solution is influenced by the techniques employed and the nature of the response of physico-chemical phenomena to changes of acidity. The cell most suitable seems to be the hydrogen and silver-silver chloride cell, as it does not suffer from defects arising from a liquid junction. Using this and adopting a value *pw*H which is a definite physical quantity and which retains its significance at all concentrations, a simple practical means of comparing *p*H values is presented.

Aluminium for the East

BECAUSE in this country aluminium has come to rank as a " bread-and-butter " commodity, whose use in the presence of formidible competition from plastics and other contemporaries cannot be expected to double overnight, there is a temptation to overlook the very different prospects which exist in other economies overseas, notably in India and Ceylon. One Scottish group has certainly not been oblivious of the great scope in the latter country for fabricators, in this instance of foil, and the resultant Colombo factory has gained substantial concessions from the local Government in the anticipation that it will ultimately provide linings for all the chests used by the tea and desiccated coconut industries. The U.K., Canada and Sweden may lose some remunerative business if that prospect is confirmed. Moves in the same direction seem imminent in India, where a recent Government estimate concludes that cooking utensils alone require 25,000 tons of aluminium a year. In the hope of becoming independent of outside sources of the metal India has developed import duties and a subsidy system, which are said to have made aluminium goods costly and handicapped the fabricators, without yielding the increased supply of metal optimistically expected.

NEW FIELDS FOR PHOSPHORUS

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secticides, all of which require phosphorus compounds as initial material for their syntheses. Parathion, for example, has created a new demand for phosphorus pentasulphide. Whether these insecticides will create a substantial and lasting demand remains to be seen. The toxic dangers associated with their use have raised serious doubts about their future expansion. On the whole, it is likely, however, that tighter regulations safeguarding their use will remove these doubts.

It may be doubted whether the British future for phosphorus production will show an expansion as spectacular as that of America. We have no deposits of high grade mineral phosphate but we require large tonnages for soil application. The possibility of rock phosphate imports being restricted can never be entirely dismissed. Fertilisers would then have to be given the major share. Another fundamental for the fuller use of phosphorus chemicals is electric power, which should be abundant and preferably cheap. It is neither in Britain today. Nevertheless, the extremely promising home demand for phosphates and the increasing export opportunity for compounds of phosphorus unavoidably suggests that in this country the industry deserves at least as much encouragement as it has had in recent years in the U.S.A.

GERMAN ENGINEERING ADVANCES

Impressions of the ACHEMA Exhibition

From a SPECIAL CORRESPONDENT

ANTICIPATIONS that ACHEMA IX, the first post-war exhibition by the German Chemical Engineering Society (DECHEMA) would receive larger backing than its 1937 predecessor have been confirmed since the opening in Frankfurt on July 9.

At the last exhibition there were 416 exhibitors; this year's event was the largest, having more than 450 exhibitors. Over 6000 registered visitors and 1200 students visited the exhibition, of whom some 25 per cent were from abroad. A fair number of British delegates were present. The whole exhibition was most attractively arranged and efficiently organised, affording excellent arrangements for the reception and entertainment of foreign visitors.

The exhibitors' stands were grouped in five halls and a sixth served for lectures and discussion groups, the sections covering (1) weighing, filling and packaging machines, (2) measurement and control devices, (3) laboratory equipment, (4) chemical plant and equipment, and (5) materials of construction.

Even in a cursory view of the exhibition it was impossible not to be impressed by the remarkable degree of recovery which has been achieved by this section of the German industry in the space of a few years, particularly remembering that many of the factories were in 1945 little more than heaps of rubble. The fact that most of the firms have spent the last five years in development and reconstruction was reflected in the numerous improvements or points of novelty compared with pre-war designs incorporated in most of the equipment and, although only a few items showed fundamental advances, there were numerous examples of improvements in detail. The general standard of finish was extremely high.

Rapid Delivery

The fact that the general level of business is not so high as in this country helps no doubt to account for the shorter delivery times offered, much shorter than for corresponding British equipment. Prices were not much cheaper, except in a few instances. Another point of advantage the German industry has over British industry is that there is apparently no shortage of special alloy steels. The general trend in chemical plant and equipment is towards smaller and more efficient units.

Another general feature which could not escape notice was the popularity of unplasticised PVC (Vinidur) as a material of construction. Almost all firms producing chemical plant include items of this material in their production programme. The emphasis seems to be on the use of Vinidur as a constructional material rather than as a lining material.

Plastic Filter Equipment

One ingenious exhibit was a filter plate made entirely from Vinidur, comprising a series of stampings held together by transverse Vinidur rods. Filter cloths woven from PVC yarn were also shown. There is also a trend towards standardisation of components and methods of manufacture with a view to reducing production costs.

The exhibition being principally concerned with chemical plant and equipment afforded little scope for the actual producers of chemicals. The few chemical firms who did exhibit were offering mainly laboratory and analytical chemicals and products related to the chemical plant industry, such as plating salts, fluxes, special resins, etc. One cannot, of course, draw any general conclusions regarding the German chemical industry from what was being shown at Frankfurt.

One of the outstanding innovations has been the use of induction heating of chemical vessels with ordinary frequency current. This provides a means of heat transmission at higher temperatures than are normally attainable by existing methods, and is effective between the range of 150-600°C. The performance is limited only by the availability of electric current.

The apparatus exhibited was simple and compact in construction and operated at ordinary frequency and voltage, requiring no frequency changer or transformer. It is suitable for application to most types of apparatus and a special application is for the heating of flowing liquids. The method is claimed to be very reliable and requires very little maintenance; the heat capacity of the assembly is low and very accurate control can be automatically obtained. It is, of course, necessary for

(*continued at foot of next page*)

British Coal Exports

Holland Turns to Cheaper German Sources

HOLLAND, which has up to now been one of the biggest importers of British coal, is to cut future imports, as British costs cannot compete with other European prices, it was announced on Tuesday.

Holland imported 903,800 tons of British coal last year.

The Dutch Government feels that imports of coal on which subsidy over a certain level has to be paid must cease, and it will grant no more licences for such imports. The National Coal Board considered, however, that the position could be straightened out by discussion and representatives were being sent to The Hague this week.

It had been foreseen that increasing coal production in Western Germany was bound to lead to keener competition for British exports (THE CHEMICAL AGE, *62*, 598). Some time ago, the Dutch began purchasing coal from the cheaper German sources. Export prices of coal from Western Germany were lowered last week.

One of the sources of dissatisfaction with the British contract has been the double pricing system of the National Coal Board, foreign purchasers being charged more for coal than the equivalent prices at home. It is known that Denmark has been dissatisfied with this system and hopes to import increasing quantities of coal from West Germany and Poland, but it is thought unlikely that she will follow Holland's lead in eliminating British imports.

A further threat to British coal exports comes from Italy where attempts to replace imported coal by indigenous petroleum and methane gas were reviewed in the Senate last week by Signor Togni, the Minister of Industry. It was reported that 500,000 cubic metres of methane gas were now being produced from 18 wells in the Po Valley. By the end of the year 26 wells would be in operation and it was hoped to reach a daily production of 2 million cubic metres.

Contemaggiore, in the Po Valley, was still the best well for petroleum, producing about 10 tons of crude oil daily. Refining machinery was expected from the U.S.A., which might permit the production of 140,000 tons of Italian petrol annually.

There was evidence of methane with petrol at a deeper level in a number of other parts of Italy, especially in the Abruzzi, in Apulia, near Milan in Lombardy, and near Messina in Sicily.

GERMAN ENGINEERING ADVANCES

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the vessel being heated to be of magnetic material or to be plated with a magnetic material.

Another notable development which has its counterpart here is the manufacture of new types of apparatus and components from carbon, graphite and ceramics, rendered mouldable by binding with thermosetting resins.

For certain special purposes, silver-plated steel is given a further plating with gold or gold alloy.

For the first time a 65 per cent ferro-silicon has been used as a plating material. This is applied in the form of small cast plates about 3 in. by 2½ in., which are welded in position inside the vessel. Hexagon-shaped plates are used on spherical surfaces. The channels between the plates are then filled with a suitably resistant cement (THE CHEMICAL AGE, *62*, 928).

Unit processes as such were not greatly in evidence, but one very interesting exhibit comprised a new small scale processing unit (three tons per day) for the continuous manufacture of Novolacs and other products, offering a considerable degree of flexibility and simplicity of control at each stage.

Two improved designs of flame spraying guns for plastics were exhibited, claimed to give tough, elastic coatings of polythene even on polished metal surfaces. It is understood that one or both of these will shortly be available in the U.K.

A number of new or improved analytical tools were exhibited and some were also described in lectures. Among the latter were an interference filter for longer wavelengths, a new flame photometer, various devices for continuous gas analysis and a new filter mass for macro-scale paper chromatography. Numerous optical instruments of traditional German excellence were also in evidence, and two firms exhibited electron microscopes.

The next Achema Exhibition is scheduled for 1953.

PROGRESS IN CANCER RESEARCH

Growing Contributions by Chemists

DEFINITE, if unspectacular, progress in cancer research was discussed by Sir Ernest Rock Carling when he presented the 27th annual report of the British Empire Cancer Campaign at the House of Lords on July 12.

Of the report itself Sir Ernest Carling said:

"If the public do not find in this number any startling developments in the treatment of cancer, there is no cause for discouragement. We have, in the past few years made very definite progress and have come to a critical moment in cancer history.

"Surgery has made considerable strides in successful operation upon cancer of the oesophagus, the stomach and the rectum. In the most active period of my career they were all sites frequently beyond curative treatment.

"The justifiable excitement produced by the introduction of hormones as treatment for prostatic cancer and its metastases—which was quite unprecedented—has died down with further clinical experience but has started a spate of chemical analysis and synthesis such as has seldom been seen.

"Radiotherapy has advanced so steadily in efficiency, year after year, that a pause was inevitable. It is about to pass from an energy range of so many thousand volts to so many million volts. It is rapidly developing the use of internal radiation.

Atomic Radiation

"We ought to pause, and ask our research workers to elucidate still further what happens when we reach those heights. We all know the radiation from atomic bombs killed. How was that lethal effect caused? It was felt that we had better make sure and there is, in consequence, hardly one of our laboratories that is not striving to make it clear.

"As an extreme example, our high-powered machines are tracing what happens when water is irradiated at high energy. What has that to do with cancer? Well, 90-odd per cent of our tissues is water, and water is essential not only for every process of the body, but also for growth itself, including malignant growth.

"The pause, then, in therapeutic advance is filled to the utmost with essential fundamental research.

"It would be true to say that chemists, physicists, therapists and geneticists all alike are now concerned not only with the most intimate structure of the body cells, but with that of the molecules of which their proteins are composed, and even with the electrons in the peripheral orbits of the atoms that go to make up those complex molecules.

It is to be remembered that some at least of the genes and of viruses are single molecules, and that there is every reason for the immense efforts being put into the study of the chemistry, biochemistry and biophysics of all of the substances to be found in the body, and of their anologues elsewhere discovered in Nature, or compounded in the laboratory. It is also to be noted that the catalogue of references to those bodies which have carcinogenetic action runs into more than 5000 items.

Protons and Mesons

"There is, in this volume, something like a microcosm of the research projects of the macrocosm of science itself. Whether it be in probing the physical and chemical effects of all bands of the radiation spectrum, whether it be exploring the properties of protons, mesons, isotopes, X or γ rays: or those of non-ionising radiation, all are to be found here.

"In physics, it is a part of cancer-research to design and build apparatus of extreme delicacy—of an efficiency, for example, 20 times as sensitive as the Geiger-counter; to utilise the most perfect means of magnification, the phase contrast, the ultra violet, reflecting, and electron microscopes and to adopt cinematography to their further elucidation: to follow up micro-techniques to the point of transferring the nucleus of one cell to the living body of another. Were I chemist enough I could describe the almost nonchalant way in which our researchers fold the long chain aminoacids of the proteins into a compact mass and cross link the members.

"Since the last report, the use of isotopes has greatly extended. Their use has brought to the fore the measures necessary for the safety of both workers and patients. When all radiation was external, safety could largely be ensured by the design of apparatus. When radioactive substances reach the body by inhalation, ingestion or injection through the lungs,

(*continued at foot of next page*)

STANDARDS FOR INDUSTRY

BSI's Increasing Aid to Exporters

THE general recognition that, to-day, standardisation is a function of industry to be discharged by it through an autonomous body, of producers, consumers, professional institutions, research associations and Government departments, was referred to by Mr. Roger Duncalfe, chairman of the general council of the British Standards Institution, in his report to its annual general meeting last week. The work of the BSI, he said, had expanded during the past year in all sections, both nationally and internationally.

The institution had distributed nearly three quarters of a million copies of British standards, many of them volumes of considerable size. It had participated in a number of exhibitions, and the library and and information service had developed substantially. Mr. Duncalfe pointed out that the library now holds copies of about 43,000 oversea standards. He also made reference to the growth in certification marking and to the work of the BSI in connection with securing approval of electrical appliances for export to Canada. During the year a further overseas committee had been set up, this time in Rhodesia, and the recognition of the value of British standards in overseas markets was becoming an increasing aid to exporters.

Sir William Larke, retiring president, calling attention to the valuable work which the BSI had done over so many years, emphasised the need for it to remain an independent body, supported by all sections of industry and government under the direct control of an elected council.

NEW DEGREE COURSES

Changes at Sir John Cass College

FOLLOWING its recent change of title from "Sir John Cass Technical Institute," it is fitting that the Sir John Cass College is to have increased facilities for study during the session beginning in September.

It is expected that war-time damage to the upper floor will be completely repaired for the opening of the new session, and that full re-equipment will by then have been completed. As a result, it will be possible for the college to run courses for the special and general degrees in botany, and for the general degree in zoology; time tables for these courses have already been published.

A further innovation includes the separation of the mathematics and physics section into two departments. An M.Sc. course has been instituted in the mathematics department, with a syllabus of electricity, dynamics and elasticity. The new session will see the last of the finals candidates for special degrees in science under the old regulations.

The continued success of the post-graduate lectures in applied analytical and technological subjects, such as micro-chemical and spectro chemical analysis, and lectures on patents and the law as applied to industry, has encouraged the repetition of last year's lectures on radio-chemical methods of analysis.

Naphthenic Acid Prices to Rise

Shell Chemicals, Ltd., announced this week that the prices of naphthenic acid NA9 and naphthenic acid NA20 are to be increased by £5 per ton and £2 per ton, respectively, as from August 1.

PROGRESS IN CANCER RESEARCH

(*continued from previous page*)

by the stomach or the blood stream, the problem of safety is quite another matter, and one with which the campaign and everybody involved in the treatment of patients must be concerned. It is one which, when every mechanical device to be devised is operating, nevertheless depends finally on a strict ritual of behaviour, and calls for conscientiously observed discipline. The apparatus is being designed; that behaviour can be dictated has been proved by the most strenuous tests in laboratories where the campaign's work is done. The matter is of high import and deserves this lengthy mention: it should be known that these potentially dangerous new methods can be employed with perfect safety.

"A non-medical reader of the report might well say, 'there is evidence of an immense number of substances with the power to produce cancer.' Not all of them are known in nature, but the potentiality for inducing malignancy is there. Yet we don't all die of cancer—not by any means. Must there not then for long ages have been at work inhibitors of their malign action?

"I daresay," concluded Sir Ernest Carling, "that it is in the study of these inhibitor substances that the most rewarding results of research will be found."

THE GROWTH OF SOLVENTS PRODUCTION

More Essentials for Modern Industries

EVIDENCE confirming the magnitude of the role which synthetic organic solvents must continue to play in the manufacturing and export industries is to be found in large recent expansions of productive capacity at Hull and Carshalton. These represent an acceleration by British Industrial Solvents, Ltd., of a continuous policy, which at Hull was initiated some 22 years ago by the parent Distillers Co., Ltd. (THE CHEMICAL AGE, *63*, 41). This production of some of the essential solvents and plasticisers has had an important bearing on the modern growth in this country of the cellulose lacquers and plastics industries.

The yield of solvents not previously readily available has been widening, both in bulk and variety, since the acquisition in 1929 of a large Hull ethyl alcohol distillery provided the source for production of acetone, butyl alcohol and acetate. From that enterprise sprang many related developments, providing first acetic anhydride, which has entered largely into the sphere of rayon plastics and pharmaceuticals, and, since the war, the successful use of isopropyl alcohol as an economical substitute for ethyl alcohol in the production of acetone.

Progressive changes since the war, such as the additions of di-ethyl hexyl alcohol and acetoacetanilide, phthalates and other plasticisers, indicate the confidence that the home and export requirements of this class of material are still on an upward trend. Acetates and similar esters are among the groups of which production capacity has been largely increased this year, and increased plant for acetic acid and anhydride and di-ethyl hexyl alcohol is now nearing completion.

The only uncertain factor, the possibility that source materials to sustain the growing output might be overtaxed, may soon be disposed of. That reassurance, intimately affecting an increasingly large number of groups of using industries, is backed by the programme of the associated British Petroleum Chemicals petroleum processing plant, being completed at Grangemouth, Scotland. Among the first materials to be produced in bulk there will be the ethyl and isopropyl alcohols, upon which many of the products of the Hull group depend.

Solvents and Wool Textiles

THE newly published report of the annual general meeting of the Wool Industries Research Association, held at Torridon, Headingley, Leeds, in May, reveals that a joint investigation is being undertaken by the association and Leeds University into the possible uses of solvent processes in the wool textile industry. A memorandum is to be prepared. The importance of strengthening the liaison between the association and Leeds University was stressed.

The new acetates plant and (right) the metering and despatch section at Hull

Parliamentary Topics

TAXATION on weed-killers was the subject of a question by Mr. A. C. Bossom, with particular reference to those having a petroleum ingredient. In reply, Sir Stafford Cripps, Chancellor of the Exchequer, stated that light hydrocarbon oil was subject to Customs Duty at the rate of 1s. 6d. a gallon or Excise Duty at 9d. a gallon, whether used as an ingredient of weed-killer or for other purposes. In the absence of precise details of their composition it was not possible to say what charges would be payable on weed-killers containing other ingredients. Weed-killers were not subject to Purchase Tax.

EXPORTS of copper semi-manufactures from Germany in March 1950 were over eight times the volume they were in 1949, stated Mr. J. Grimston. He asked the President of the Board of Trade what steps were being taken to meet this competition. In a written answer, Mr. Harold Wilson, President of the Board of Trade, agreed that a substantial increase in exports of copper semi-manufactures had occurred in the period, but, in the absence of any evidence of unfair trading practices, he said he had nothing to add to his answer on June 15. (On that date, the Minister said that, as a result of Germany's post war return to industrial production, competition was being encountered, among other items, in semi-fabricated non-ferrous metals. If there was any evidence of German goods being sold by dumping methods, below the cost of production, he would investigate the matter with the German authorities.)

THE creation of an aluminium producing industry in Africa by making use of the Volta river hydro-electric and irrigation scheme in the Gold Coast was the subject of questions by Mr. John Grimston, who reminded the Secretary of State for the Colonies that it was four months since he said that the report would be hastened. Was the Minister aware, asked Mr. Grimston, that the scheme had now been under investigation for three years? Mr. T. F. Cook, Under-Secretary of State for the Colonies, said that there were actually two investigations in progress. The Gold Coast Government expected to receive an interim report shortly, but he could not say precisely when the final report would be received.

DISCHARGE of effluent and sewage in the rivers Dee, Eden, Lune, Ribble, Severn and Tyne was questioned by Mr. J. Grimston. In a written answer, Mr. A. Bevan, Minister of Health, said that enforcement of the Rivers Pollution Prevention Acts was one of the statutory functions of the new river boards now being established. One such board is already operating for the river Severn and others will shortly be set up to cover the other rivers referred to. Until such time, stated the Minister, responsibility rested with local authorities or existing joint boards. He was prepared to assist these authorities to the fullest extent in the reduction of pollution.

REPLYING to Mr. Cyril Osborne, Sir Stafford Cripps said that the exact increases in prices of oil, rubber, tin, lead and wool since devaluation varied according to commodities. That applied especially to oil and wool. The approximate increases in sterling prices since the middle of September 1949 were these: Rubber 170 per cent, tin 24.5 per cent, lead 9 per cent, wool 55-75 per cent, oil and petroleum products 45-50 per cent.

Smokeless Zone in Manchester

THE recommendation that a smokeless zone be established in the centre of the city was made this week by the Manchester health committee to the city council. In the proposed area there are more than 2000 open grates, boilers, kitchen ranges and heating stoves not operated smokelessly, which would render their users liable to fines under the Corporation's Act of 1946. The regional gas and electricity boards have stated that there would be no difficulty in supplying equipment or power to meet the increased demand.

Des Voeux Memorial Lectures

THE summer issue of "Smokeless Air," the journal of the National Smoke Abatement Society, announces that the society is inaugurating an annual Des Voeux Memorial Lecture to commemorate its first president, the late Dr. H. A. Des Voeux, who worked untiringly for a cleaner atmosphere until his death in 1943. The first is to be given at the conference of the society to be held in Margate in September, and will be read by Dr. D. T. A. Townend.

MICROCHEMISTS UNITED IN GRAZ

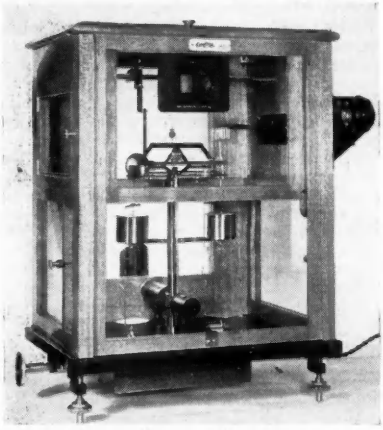
Efforts to Secure Standardisation of Apparatus

From A CORRESPONDENT

THE First International Microchemical Congress,* organised by the Austrian Microchemical Society, held in Graz from July 2-6 attracted well-known analytical chemists from all over the world. Almost 600 members, representing 29 nations, were registered.

To open the programme of the congress, an exhibition of microchemical apparatus and literature was visited on the afternoon of the first day at Studenthaus. This, occupying nearly two floors included apparatus made by all the principal European manufacturers, Austrian, British, French, German and Swiss. British microchemical balances were notably well represented. Among the book exhibits were shown a number of classical microchemical publications.

During the course of this afternoon, and, indeed, throughout the congress, opportunities were given to visit the Pregl Laboratories in the university, and to see the apparatus and methods at present in use there, and early apparatus used by Pregl, which is now of historical importance. A number of the awards and distinctions conferred on Pregl recognising the importance of his contributions to the early development of microchemistry were also displayed.



One of the British contributions to microchemical apparatus shown at Graz, the new aperiodic microchemical balance, with weight loading, providing direct reading of one microgram per division

Many members of the congress were interested to examine the record book, and to find there their own names, inscribed when they received their first training in microchemical methods in Graz.

Later the same afternoon was unveiled a plaque to the memory of Emich, the other recognised doyen of classical microchemistry. This plaque looks eastwards from the Schlossberg over the city of Graz.

In the evening, members of the congress attended a social evening in the Steirerhof Hotel at which they were able to renew old acquaintances and form new ones. The tables being decorated by the flags of all the nations taking part.

At the official first meeting of the congress in the Stephaniensaal on the morning of July 3 members of the congress were welcomed by the president of the congress, Prof. H. Lieb. Representatives of countries then presented addresses of greetings to the Austrian Society, that of Great Britain being read by R. Belcher, of Birmingham University, who attended in his official capacity as chairman of the Microchemistry Group. He also represented the parent body, the Society of Public Analysts and Other Analytical Chemists.

Honorary membership of the Austrian Microchemical Society was conferred on these internationally known microchemists, the citations being made by G. Gorbach; H. K. Alber, of Philadelphia; A. A. Benedetti-Pichler, of New York; and F. Feigl, of Rio de Janeiro (all of whom originally worked in Austria); R. Belcher, of Birmingham; J. Donau, of Graz (for many years a colleague of Emich), C. Duval, of the Sorbonne, and R. Strebinger, of Vienna.

Two Anniversaries

A bronze bust of Emich was unveiled by his daughter, and the proceedings closed with an account by A. A. Benedetti-Pichler of the work of Emich. The 10th anniversary of Emich's death, as well as the 20th anniversary of the death of Pregl, coincide with this congress.

During sessions for the reading and dis-

* The British contributions have already been summarised (THE CHEMICAL AGE, 63, 86.)

cussion of papers, from the afternoon of July 3 till the close of the congress on July 6 nearly 130 papers were presented, in two main divisions: General Microchemistry and Applied Microchemistry. It is noteworthy that about 70 per cent of the papers were presented by microchemists who are not Austrians. Summaries of all these have appeared in the June issue of the Austrian *Chemiker-Zeitung*, and it is anticipated that the papers and discussions will be published in full in the next issue of *Mikrochemie* (Springer-Verlag, Vienna).

British microchemists were well represented by the papers of Dr. G. Hodsman (Developments in Microchemical Balance Design), A. K. Al Mahdi and Dr. C. L. Wilson, of the Queen's University of Belfast (The Separation of Metal-Organic Complexes), R. Belcher and R. Goulden, of Birmingham University (The Determination of Carbon and Hydrogen in Fluorine-Containing Compounds), G. Ingram (Rapid Micro Combustion Methods for the Determination of Elements in Organic Compounds), Dr. R. L. Mitchell, of the Macaulay Institute for Soil Research, Aberdeen (The Spectrographic Determination of Trace Elements in Rocks, Minerals and Soils), and Dr. C. E. Spooner, of the National Coal Board, North West Region (Microchemical Methods Applied to Industrial Materials).

At an unofficial international meeting, whose conclusions were later ratified at the closing meeting of the congress, it was agreed that efforts should be made to hold the Second International Microchemical Congress in 1954. Several possible locations were mentioned, among them Brussels and Milan, but no definite decision was taken.

Towards Standardisation

It was agreed that a small international committee should be formed which should seek the help of the International Standards Organisation at Geneva in collecting and circulating to all countries concerned the work on standardisation of microchemical apparatus which has already taken place, especially in Great Britain and the U.S.A. This committee, consisting of Dr. H. K. Alber (U.S.A.), Mr. R. Belcher (Great Britain) and Dr. G. Gorbach (Austria) will carry out this work as a preliminary step towards the international standardising of microchemical apparatus and methods.

Prof. van Nieuwenburg, of Delft, told the congress that he had been authorised, on behalf of the International Union of Chemistry, to approve the formation of a sub-committee to be concerned with matters of particular importance to microchemists. Dr. M. Zacherl, of Vienna, editor of *Mikrochemie*, was nominated as the chairman of this sub-committee, and in accordance with the practice for committees of the union, he will select the members to serve with him.

A Successful Congress

Apart from the social evening mentioned, receptions and dinners were given to the members by the Burgomaster of Graz and by the Styrian Government. The latter entertainment was preceded by a display of folk-dancing and music, presented in the garden of the Burg, a typical example of the customs of Styria. Another social evening was held at Hilmteich, in the suburbs of Graz, and members of the congress were enabled to attend one of the concerts of the Graz Musical Festival.

The Austrian Microchemical Society is to be warmly congratulated on the success of this first congress and upon the success with which they attacked the task of housing and catering for an attendance much larger than had been anticipated, which severely strained the available facilities. Much credit is due to the organising staff, headed by Dr. H. Malissa, of Graz Technische Hochschule.

International Optical Commission

MEETINGS of the International Optical Commission were held in London in the apartments of the Royal Society on July 17 and 18. The Commission, part of the International Union of Pure and Applied Physics, was constituted at Delft in 1948, after a preparatory meeting in Prague in 1947, to further international scientific relations in the field of optics. The London meeting was the first since the formation of the Commission in Delft, and attracted some 30 representatives from overseas. The president of the Commission was Mr. T. Smith, F.R.S. (Great Britain) and the secretary Professor P. Fleury, of the Institut d'Optique in Paris. The Commission was followed by, and is holding joint meetings with, the London Conference on Optical Instruments at the Imperial College of Science and Technology from July 19 to 26, 1950.

Evans Transport Unit

Evans Medical Supplies, Ltd., has transferred its transport unit to new buildings specially constructed on the company's site at Speke, Liverpool.

NEW PLASTICS SOURCE

Possibilities of Nuclear Fission

THE possibility of new materials for plastics being evolved as the result of the development of atomic power was forecast by Mr. H. V. Potter, chairman of the plastics group, in his address to the annual general meeting of the Society of Chemical Industry at Newcastle-on-Tyne.

He said it was hard to forecast whether many new synthetic products would arise from the methods of nuclear fission employed. There was, however, a chance that the use of this source of energy, which had been mostly confined to its effect on the mineral world and the inorganic atoms, might lead to the development of some highly active bodies.

If atomic energy could be so applied that coal was no longer required for generating power and heat, consumption of coal for gas and coke might fall, then coal could be primarily considered for destructive distillation to secure an entirely new series of organic products from which might come a new supply of raw materials for the chemical industry as a whole.

The need to develop the latent resources of the more backward countries in order to create a new wealth was emphasised by Lord Bruce, former High Commissioner for Australia in London, when he delivered the Messel Medal address to the SCI. It was essential for such countries that they should in future be able to provide for themselves many of the manufactured goods which they used to receive from the older industrial countries.

Two things were necessary to achieve this end, stated Lord Bruce. Scientific, technical and administrative assistance must be provided to the backward areas, and any supplementary external loans granted which they might require in addition to full utilisation of their own financial resources.

Steelworkers Dismissed

TWO hundred steelworkers—the entire staff fo the Dundyvan Ironworks, Coatbridge, Lanarkshire—received dismissal notices along with their holiday pay on July 14, when the works closed down. Only about half a dozen maintenance workers are being retained. The possible date of reopening is unknown.

The dismissals at the Dundyvan works bring the total number of men paid off on the eve of the Glasgow Fair holiday to 400. The other works concerned are the British Tube Works, the Coatbridge Tinplate Works, and the Woodside Ironworks.

WOOL RESEARCH LEVY

Compulsory Contributions Proposed

THE importance of scientific research in the development of the wool industry is recalled by the statement by Mr. Harold Wilson, President of the Board of Trade, that approval of Parliament is being sought for a levy on the industry to help in furthering research work.

Voluntary subscriptions have, up to now, been the mainstay of the wool textile research institutions and laboratories, which together with the textile departments of the universities have carried on very valuable work. Legislation giving a firmer financial background would be welcomed by these associations.

It is being emphasised in the industry, however, that research must not be dictated by any Government department. No objection to the scheme would be raised provided control remains elastic.

One problem of such a levy would be the assessment of individual contributions. The results of research investigations would, of course, be made available to all.

British Plastics Exhibition

THE British Plastics Exhibition and Convention will be held from June 6-16, 1951—within the period of the Festival of Britain. The exhibition, the first of its size and kind, will be held in the National Hall, Olympia, and will be open to the public. The exhibitors will be British and Commonwealth firms who produce, mould or fabricate plastics or supply raw materials or equipment for the plastics industry.

The exhibition and convention are being organised by *British Plastics* in collaboration with the British Plastics Federation, the Plastics Institute and the Plastics and Polymer Group of the Society of Chemical Industry. The convention will be held in an adjoining hall. Sessions will include lectures for technicians in the plastics industry, and afternoon technical lectures for the chemical and consumer industries.

Nylon Plant Fire

Four employees were injured—one of them seriously—as the result of a fire which occurred last week in the nylon polymer plant of Imperial Chemical Industries, Ltd., at Billingham-on-Tees. Only slight damage was caused, and the fire was quickly brought under control by the joint efforts of the Stockton and Billingham Fire Brigade and the I.C.I.'s own works fire service.

MODIFIED PHENOLIC RESINS

Useful Characteristics of Nitrile Rubber

From A CORRESPONDENT

NITRILE rubber is now an important modifying agent for phenol formaldehyde resins and it is of special value for making new moulding compounds possessing improved impact strength and shock resistance.

Some commercial grades of nitrile rubber phenolic moulding powders are characterised by a low modulus of elasticity (0.6×10^6 p.s.i. in tension) which enable them to be used in thin sections around metal inserts. Moulded parts are capable of standing repeated abuse without failure.

Moulding Characteristics

Nitrile rubber phenolic compounds can be injection or compression moulded and their mouldability is generally about the same as that of general purpose grades of powder. Moulded articles have a good surface appearance and are particularly suitable for tool handles and special electrical components which require a combination of good insulating properties and great toughness.

As a result of considerable experimental work carried out in America by B.F. Goodrich Chemical Company, a finely divided nitrile rubber powder is now available to American moulding powder manufacturers. This powder can be readily blended with the phenolic resin and fillers before the mixing operation so that normal phenolic milling operation is not affected. Previously great difficulty was experienced in mixing the granular nitrile rubber with phenolic resins.

The main advantages claimed for nitrile modified phenolics can be summarised in this way:—

1. Moulded articles possess greater impact strength than ordinary shock-resistant mouldings.

2. The resilience of nitrile rubber-phenolic powders enables these materials to be moulded in thin sections around large inserts and around inserts subject to vibration and flexing, without danger of failure in service.

3. Parts moulded from the new compounds do not fail when subject to rapid temperature changes from 40°C. to 120°C.

4. Moulded parts have low density, excellent finish, high gloss on low draw or transfer moulded parts, and an ability to hold self-tapping screws tenaciously.

5. Disadvantages include the need to employ greater care in milling operations and increased cost of the blends, owing to the relatively high price of nitrile rubber.

Apart from its use for modifying the properties of phenolic moulding powders, nitrile rubber is also of great value for making adhesives based on the two compounds. Nitrile rubber is readily compatible with phenolic resins and the two materials are soluble in the solvents of the other. Unlike natural rubber, nitrile rubber is soluble in ketones, which also dissolve phenolics, it is insoluble in saturated aliphatic hydrocarbons. That is the reverse of the characteristics of natural rubber.

Adhesives based on nitrile rubber and phenolic resin blends possess excellent bonding properties and, except for natural rubber, butyl rubber and polythene, they will bond together most materials. The list of suitable materials includes cork, paper, leather board, polyvinyl chloride and vinyl co-polymers, nitrocellulose, cellulose acetate, nylon, urea and phenolic resins, iron, brass, aluminium, wood, etc.

Two Forms

There are two main grades of adhesives consisting essentially of nitrile rubber modified phenolic resins: adhesives made by blending together water dispersions of phenolic resins with nitrile rubber latices; and solvent-type cements produced by dissolving phenolic resins and nitrile rubber in acetone or methyl ethyl ketone. Bonds of excellent strength can be obtained by using these cements and allowing the solvent to evaporate; curing at temperatures of 250°F. greatly improves the heat resistance.

While nitrile rubber is of value for modifying phenolic resins, the reverse is also true. The addition of relatively small amounts of phenolic resins in nitrile rubber results in a very high degree of reinforcement, especially in tear and abrasion resistance. Shoe soles and basket ball covers are examples of rubber parts in which the reinforcing effect of phenolic resins is utilised.

Heat and Power for Petroleum Chemicals

by E. BONWITT and H. E. CHARLTON, A.M.I.Chem.E., M.Inst.F.*

THE Petrochemicals plant will be able to produce a wide range of organic chemicals from 75,000 to 100,000 tons per annum of petroleum naphtha, and it can easily be extended to about double this capacity. Distillation processes at Partington are operated with temperatures and pressures covering a wide range. The materials to be processed differ greatly in boiling point; some are gaseous at ordinary temperatures and some are sensitive to the effect of high temperatures.

Generally the temperature at the point of application of heat in fractionating columns — 150° C.-400° C. — is somewhat higher than the boiling point of the particular chemical being obtained at that pressure. Steam at various pressures is used for heating in the lower temperature ranges, *i.e.*, up to 250° C., and hot oil heating or direct firing has been employed above this temperature. In the sub-zero temperature range, cooling and heating are done by the evaporation and condensation of various refrigerants.

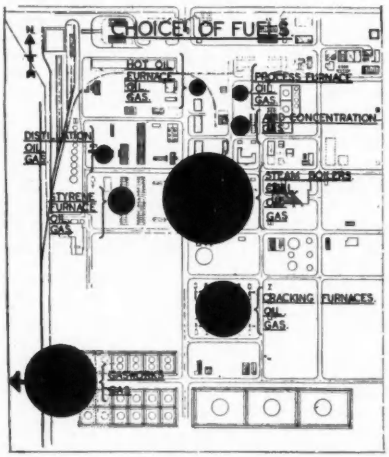
Apart from distillation, heat is required for such purposes as:—

(1) Cracking of naphtha into a mixture of gases and liquid products at about 700°C. (a highly endothermic reaction).

(2) In the manufacture of isopropyl alcohol from propylene considerable quantities of sulphuric acid have to be concentrated from a lower to a higher strength, involving the expenditure of heat.

(3) Many products are very viscous or even solid at ambient temperatures. Tanks, pipelines, pumps and valves dealing with them have to be heated.

(4) Space heating.



Relative requirements of the fuel-consuming units

Ancillary Power

A supply of power (as distinct from heat) is required for the pumping, compressing and mixing of the products, for providing cooling water and compressed air, for lighting and welding and for motor-driven machines in the workshop.

The first choice of fuel for power plants in this country is coal, since its price is stable and no question of foreign currency is involved. For the Petrochemicals plant the decision was not so simple, and oil was chosen in preference to coal.

Coal could have been used only for the steam boilers. Gas and fuel oils are the possible alternative fuels for all purposes in the plant. Fuel gas is available as a by-product from the gas separation plant: it consists of those gases which are not required for chemical synthesis and it has a calorific value of about 1000 B.Th.U./cu. ft. A considerable quantity of this gas is being supplied to the Gas Board for blending with water gas produced in their works at Partington. There is provision for storage in a relatively small fuel gas holder.

There are various plant units which can use either fuel oil or gas. The sulphuric acid concentration plant, being of the submerged combustion type, is limited to the use of gas.

By far the largest fuel consumer is the boiler plant. This is therefore most suitable as a buffer to balance the gas production against the requirements of the gas-works. For boiler firing, gas and the alternative fuel would have to be burnt in all proportions between 0 and 100 per cent gas. But it is impracticable to burn

* Abstract of the paper read before the Institute of Fuel (*Journal of the Institute of Fuel*, July 1950). The authors are members of the firm of Petrocarbon, Ltd.

100 per cent gas in a coal-fired boiler with grate, and pulverised coal would therefore be essential, necessitating much larger combustion chambers and considerable additional expenditure on dust-collecting plant.

A major disadvantage of the use of coal as a fuel in this particular works is that it would have ruled out the possibility of having a centrally disposed power station. The sidings for bringing the coal to such a station would have occupied a considerable area, and a much larger area than this would have been unusable in view of the proximity of chemical plants which involve the treatment of inflammable materials.

Placing the power station at the periphery of the plant would have increased by hundreds of feet the length of the service pipelines leading from the station, and they would in many cases have had to be of greater diameter to avoid excessive pressure drop. Higher losses in these lines would have added to the operating costs.

Capital Outlay

The capital outlay on the additional equipment for a coal-fired plant would have been very considerable. It would have had to cover the difference in cost between oil storage and pumping arrangements on the one hand, and the much more expensive coal-handling and pulverising plant on the other; it would have had to provide also for the plant for the collection and disposal of ash and dust, for the increased price of boilers with larger combustion chambers and for the additional cost of a much larger building.

Approximate estimates show that the annual costs for amortisation, interest and maintenance of such additional plant for an installed capacity of 170,000 lb./hr. steam would be between £15,000 and £20,000.

The running costs would also be increased by the additional labour and power required and by the fact that the efficiency of a coal-fired station would be about 3 per cent less than that of the oil-fired plant. These items add up to approximately another £12,000 per year.

Taking a broad overall view, it is felt that the decision to use fuel oil was a correct one for this plant.

It is obvious from the temperature ranges covered that steam should be used as the heating medium wherever possible. The lowest steam pressure was fixed at 20 p.s.i., as below this value the steam pipeline diameters and the heating surfaces in the plants would have been excessively large. The condensation temperature of 20 p.s.i. steam covers a number of process heating applications and all the space heating.

The next higher steam pressure had to be sufficient to allow a reasonable pressure drop in engines and pumps exhausting at 20 p.s.i. This set the minimum pressure at about 100 p.s.i.; the final pressure selected was 150 p.s.i., this being the maximum for which standard steam pumps and similar equipment are usually built. The condensation temperature of steam at this pressure is 185°C., which covers a further fair range of process heating requirements. 600 p.s.i., with 250°C. condensing temperature, was the final choice for the next higher steam pressure. Hot oil covers the next range, from 250°C. up to 375°C. Beyond this temperature direct-fired furnaces had to be used.

Hot oil has the following advantages over direct firing: (1) Easier temperature control. (2) Furnaces can be built remote from the danger areas. (3) One furnace can be used for several plants. (4) Local overheating of the products is avoided.

The simplest solution would have been to buy both steam and electricity from the new Carrington power station, less than a mile away, and which it was thought in 1945 would be ready at about the same time as the Petrochemicals plant.

Considerable alterations would, however, have been required to the standard design of the station to enable it to supply low-pressure steam, and the opinion of the Central Electricity Board was that it was not worth while to change their main plans (and thereby delay completion of the station) in order to secure the relatively small amount of steam load which would have been taken by the Petrochemicals plant.

Alternatives

Three alternative systems considered are based on the following four premises: (1) That as a basic requirement steam is needed for heating in the various process plants. (2) That "process steam" includes all steam which is condensed to water, and the total steam so condensed is equal to the steam load of the boiler plant. (3) That all electrical and mechanical energy required for the plant would be generated by back-pressure equipment. (4) That sufficient steam should bypass the various prime movers to allow for load fluctuations.

Scheme 1 assumes a relatively cheap boiler plant operating at 300 p.s.i. pressure and 100 p.s.i. intermediate pressure. This allows about 2000 h.p. to be generated in back-pressure steam engines and

approximately 800 kW in a turbo-alternator. It necessitates the purchase of 1200 kW from the electricity grid and increased fuel oil consumption on hot oil furnaces to cover the heat range between 200° and 250°C. Should additional electrical energy be required for future extensions it would be possible to superimpose a steam plant operating at 1200 p.s.i., and this would give at the present steam consumption about 2000 kW.

Scheme 2 assumes that steam is generated at 600 p.s.i. and that pass-out turbines are used, expanding to 150 p.s.i. and 20 p.s.i. In this way, with the process steam requirements at 150 p.s.i. and 20 p.s.i., the electrical energy which could be generated would be about 3600 kW. All power requirements would then be met from this electrical source.

Scheme 3 is the system which was chosen. Back-pressure turbines working between pressures of 600 p.s.i. and 150 p.s.i. were installed, giving an electric power output of about 2000 kW. An additional 2000 h.p. of mechanical power is obtained by steam engines and pumps working between 150 p.s.i. and 20 p.s.i.

The following are the reasons for the selection of this scheme.

(1) In plants with a variable capacity, steam drive is preferable to electric because of the ease with which the speed can be controlled.

(2) Steam drive, especially for the larger powers, is to be preferred in plants where there is any fire risk from inflammable vapours.

(3) Scheme 2 is far too rigid. A high turbine efficiency can be obtained only with a fixed set of conditions.

Greater Flexibility

(4) Scheme 3 is much more flexible, particularly for plant extensions, as the balance between steam and electrical drive can be maintained by choosing the appropriate prime movers.

(5) Although Scheme 3 involves burning more fuel, less power has to be purchased. In 1946 the additional expense involved in purchasing the 1200 kW required was higher than the cost of fuel for Scheme 3 plus the amortisation and other charges on the extra capital required for this scheme.

It may appear that this heat/power balance is too precarious for a power station which serves such a variety of plants. There are, however, certain controllable factors which allow the balance to be maintained. For example, a number of electrically driven fans, pumps and compressors have steam-driven standby units. Further adjustment between steam and power is possible by increasing or decreasing the intermediate steam pressure, which is normally 150 p.s.i.

The large heat capacity of storage tanks for heavy products is another means of utilising surplus low-pressure steam that may be available at irregular intervals, *i.e.*, during the night hours, when there is an extra lighting load.

Experience has shown that the steam and power requirements of the processes alter in approximately the same proportion, and thus a good balance can be maintained over long periods and over wide ranges of plant capacity. Some 150 p.si.. steam is raised from waste-heat boilers which form part of the cracking furnaces.

Percentage Heat Utilisation

83.37 per cent of the heat in the fuel is utilised, of which 4.53 per cent constitutes electrical energy and 4.15 per cent mechanical energy. 6.49 per cent of the heat is returned in steam condensate, which is used partially as feed water and partially for desuperheating.

Even if at certain periods it proves impossible to maintain such a perfect balance, and more steam is condensed than is required in process plants, the efficiency of power generation will still be much higher than could be achieved by the most efficient condensing power station.

The power plant at Partington is intermediate in size between the public utility power station and the small industrial installations, and so has quite distinct functions. It has been designed to combine the highest possible thermal efficiency for both steam and power generation with limited capital costs. without sacrificing reliability. Its layout has been planned to permit considerable future extensions.

The boilers have been designed to be erected in the open, which saves considerably on building costs. There is nothing unusual in this in the petroleum industry, where most of the equipment is, for reasons either of economy or of safety, erected in the open air. The boilers have a watertight casing of sheet steel on a strong steel framework. This casing serves the dual function of weather protection and support for insulation and refractory brickwork.

All impulse lines, pressure gauges and flow controllers which contain stagnant water, and so could be damaged by frost, are traced with low-voltage heating wires and lagged. It has been found that the surface temperatures of the casing are quite moderate so that the latter can be

treated with either ordinary paint or standard heat-resisting paint.

Radiation losses are very small for this type of boiler with water tubes in the combustion chamber and a low gas exit temperature. The influence of the external temperature on the boiler efficiency is therefore insignificant.

As only the boiler fronts and the instruments are under cover, each boiler requires not more than 12,000 cu. ft. of roofed space. If a building had been erected around the boilers an additional 48,000 cu. ft. would have been required per boiler.

There are three water-tube boilers, each of 56,000 lb./hr. maximum continuous rating. They are of the Foster Wheeler marine type, built by Richardsons, Westgarth & Co., for 625 p.s.i., 415°C., at the stop valve. The combustion chamber is surrounded on three sides and on the roof by steam-raising tubes.

Full Scope for Expansion

The boiler efficiency is over 90 per cent, based on net calorific value of the fuel. Each boiler has five burners with on oil jet in the centre and an annular gas ring, so that gas and oil can be burnt separately or together.

As the boilers are installed in the open there is practically no limitation to the size or type of steam-raising plant which can be installed in the future around the power house. Only those parts of the installation which require weather protection (such as electrical de-oiling plant, instruments, and a number of pumps) are inside the boiler house—the rest are outside, close to the fuel oil tanks. The fuel oil pumping and heating equipment is in the centre of the boiler house. From here a ring main carries fuel oil under 250 p.s.i. pressure to the boilers. A second ring main is arranged to serve future boilers on the opposite side of the building.

This building is only 48 ft. wide and 25 ft. high, and even so it provides for a firing aisle for the future boilers. The ground floor is the operating floor for the boiler attendants; it accommodates in the centre the forced-draught fans, feed pumps and fuel oil pumps, heaters and strainers. Each boiler has its own electrically-driven forced-draught fan. One common steam-driven fan can be connected to any of the three boilers by means of underground ducts and dampers.

There are two electrically-driven and one steam turbine-driven induced-draught fans, with space for another unit. The steam turbine starts automatically when the pressure in the flue rises above a predetermined level.

As the steam and power supplies have to be maintained continuously throughout the year all mains are duplicated or form part of a ring. There are, for instance, two feed water suction lines with connections to each pump, two feed water delivery lines with connections to each boiler, two steam lines to the turbines, two turbine exhaust lines and so on.

Fuel oil and gas lines to the boilers are arranged along the outer wall, together with such services as compressed air (for instruments) and town water, which are operated from a platform above the aisle in the boiler plant house.

All steam-reducing and desuperheating equipment is controlled from a panel at one end of the boiler house. This panel carries all indicating and recording instruments. The air-operated automatic controllers are mounted behind the panel and are connected to the reducing valves and injection nozzles by means of mechanical links. Should compressed air fail or anything else go wrong with the automatic operation, every single point can be controlled by means of a handwheel. This centralised control of steam conditions on the plant has proved to be very valuable.

There are two 2000 kW back-pressure turbines of Brown Boveri design, built by Richardsons, Westgarth & Co. The turbines run at 6000 r.p.m. and contain an impulse wheel and 18 reaction stages. The Mather & Platt 3300-volt salient-pole alternators run at 1500 r.p.m. and are driven through a single-reduction gear.

The main switchboard consists of a number of standard cubicles arranged to present a flush front. The high-voltage cubicles have doors which allow the oil circuit-breakers to be withdrawn from the front.

Control Gear

All control gear is arranged on panels between the high-voltage and low-voltage boards and on a control desk in front of them. From these points, cooling water pumps and their electrically operated valves can be remote controlled and all high-voltage circuit-breakers can be closed or tripped. A mimic diagram with signal lamps indicating the position of breakers and isolators assist the operator.

In a plant of this type it is essential to keep certain pumps and plant working in all circumstances. This applies particularly to the cooling water pumps, which must in no circumstances stop, otherwise a dangerous situation is created. As the Electricity Board could not provide a standby supply of more than 500 kVA, a

standby diesel alternator set of 330 kVA has been installed. Should the main power plant fail, an automatic relay connects the grid supply, via a transformer, to a part of the low-voltage switchboard, whence it is distributed in accordance with an emergency "drill".

Electricity is sent out at 3300 volts to a number of substations arranged at load centres outside flameproof areas. Each substation consists of a 3300/420 volt transformer and the necessary 420 and 240 volt distributing and control gear. High-voltage feeders are laid out radially and have breakers only at the power station end, with push-button trips in the sub-station.

Of the 1000 electric motors installed at the Petrochemicals works two-thirds are flameproof. Because of the long delivery times quoted for flameproof switchgear, as well as for reasons of safety, it proved more attractive to use remote controlled contactor starters of standard non-flame-proof design. They are installed in the substations and are operated by flame-proof push-buttons at the motors.

The provision of suitable feed water for high-pressure steam plant is one of the most important problems of an industrial power station where steam is used for process work. In the Petrochemicals plant between 50 and 60 per cent of the generated steam can be economically returned as condensate. 75 per cent of the returned condensate contains cylinder oil, and all condensate is liable to be contaminated in the event of leakage on any of the many heat exchangers. The make-up water, drawn from the Manchester Corporation Water Works, is a very good water, with only 35 p.p.m. total dissolved solids, very little temporary hardness and approxi-mately 20 p.p.m. permanent hardness.

Choice of Feed Water

For the supply of feed water a choice had to be made of four, as follows: (1) 100 per cent chemically treated make-up water. (2) Condensing of turbine steam in a heat exchanger which generates the plant process steam at 150 p.s.i. (steam conversion). (3) Distillation of returned condensate plus chemically treated make-up water. (4) De-oiling of condensate plus chemically treated make-up water.

The first step in removing oil was to provide steam exhaust mains at pump houses with a Vortex-type oil separator. These separators remove the bulk of the oil and keep the heating surfaces of the various steam-using plants reasonably free from oil.

The oil-free condensate returned from steam traps at 150 p.s.i. is collected in the one vessel and steam is flashed into the 20 p.s.i. main. A steam-operated pump-ing trap delivers this condensate into the oil-free condensate main. The other vessel collects oily condensate and has its independent pumping trap. It is fitted with a safety valve set at 2 p.s.i., which prevents air from getting into the return system and causing corrosion.

Easy Separation of Oil

Only pure mineral oil is used for lubri-cating purposes throughout the plant. The use of any compounded oil is strictly prohibited.

The first step is a separation by gravity at the temperature of the returning con-densate, which is at least 95°C. With mineral oil at this temperature the separation is easy and the effluent con-tains less than 3 p.p.m. of oil.

The second stage is an electrolytic de-oiling plant. The condensate is made electrically conducting by the addition of a suitable electrolyte and is then passed in zigzag flow over and under mild steel electrode plates contained in wooden tanks. There are 20 plates in each set, the end plates of which are connected to the poles of a 200 volt d.c. supply so that there is 10 volts potential difference between consecutive plates. Ferric hydroxide is formed, which coagulates small oil particles. The effluent passes through anthracite filters and is then crystal clear (approximately 0.3 p.p.m. oil).

The third stage in the de-oiling process is a filtration through a bed of activated carbon. Hydraffin. which is a charcoal prepared specially for the adsorption of oil in water, was chosen. This stage pro-duces little reduction in the oil content, its main purpose being to serve as a final screen in case of failure in the previous stages.

An important problem in such a de-oiling plant is the correct measurement of small quantities of oil. The usual extrac-tion methods break down when one approaches the order of 0.5 p.p.m., because the quantities of oil are too small for cor-rect weighing. Fluorescence could be used as an indicator but would probably not give reliable quantitative results, as not all the oils in question give the same degree of fluorescence.

The following method was therefore developed: A sample in a 30 in. long glass tube is viewed longitudinally with good illumination at the far end. and if the sample contains more oil than 0.2 p.p.m. it shows a definite cloudiness, which

can be compared against prepared samples of various oil contents. The method requires, of course, an absolutely colourless effluent and this is one of the reasons why particular care must be taken in the choice of the electrolyte.

All other treatment of feed water follows conventional lines. Manchester Corporation make-up water is first used as cooling water for oil and air coolers of the turbo-alternators and air compressing plant. Heat recovery from these sources is equivalent to 1 per cent fuel saving. After this the water is heated by continuous-blowdown water and softened in a sodium zeolite plant. Finally it is collected together with clean and de-oiled condensate.

The cracking of naphtha to form olefinic gases and a highly aromatic liquid product takes place in two stages. The first —the breaking down of the molecular structure of the naphtha to form lower hydrocarbons—is a highly endothermic reaction; and the second reaction—to form a fully aromatised liquid—is practically thermo-neutral under isothermal conditions.

Design of Cracking Furnace

The cracking furnace is designed to carry out these reactions in the most effective way. The tubes in which the first reaction is carried out are heated by radiant heat from five down-draught gas or fuel oil burners disposed in such a way as to ensure the most even heat distribution.

The second stage of the process is achieved in the lower part of the combustion chamber. A certain amount of flue gas is recirculated to modify and control the temperatures so that the aromatisation reaction can take place under essentially isothermal conditions. The heat in the flue gas leaving this furnace is used to vapourise the incoming naphtha by convection. Finally, before passing to the chimney the flue gas gives up its heat to waste-heat boilers.

Before it was put into operation, some qualms were felt about the gas flows in this furnace, where recirculated flue gas was injected at right angles to the down flow of gas. It was feared that eddy currents would be set up and so prevent the proper working conditions being achieved. To check this a model was made in Perspex and the gas flows were reproduced by water flowing at the same Reynolds numbers. Coloured inks were injected into the various streams so that the flow of flue gas could be followed visually.*

* Dr. P. O. Rosin's method

A complex mixture of hydrocarbon gases coming from the cracking plant is compressed and cooled to a temperature at which the desirable components such as ethylene are liquefied. The components which remain gaseous are hydrogen and a certain amount of methane. The liquid components are then fractionally distilled at low temperatures to give pure methane, ethylene, ethane and propylene-propane.

Cascade Refrigeration

The low temperatures in the fractionating columns, the lowest being −135°C., are obtained by a cascade system of refrigeration. The ammonia absorption plant (the first step in the refrigeration cascade) consumes a considerable quantity of heat, which is supplied as 150 p.s.i. steam. The ethylene and the methane cycles work on the conventional compression system.

It would have been possible to use the same refrigeration system for ammonia, instead of the absorption type, but for an evaporator temperature of −50°C. the volumes of ammonia which would have had to be compressed would have been so great that the steam consumed by the driving engines from 150 p.s.i. down to condenser pressure would have been considerably greater than the steam required at that pressure in the anhydrous ammonia generators. In addition, the compression system would have cost more, would have taken longer to build, and would have introduced technical difficulties due to the ammonia being compressed from sub-atmospheric pressures.

For this gas-separation plant six compressors of about 500 h.p. each were required, two of these (for cracker gas) being two-stage and the others (for ethylene) being single-stage. Three smaller compressors of about 60-120 h.p. each were needed for methane.

Compressor Alternatives

The choice had to be made between vertical and horizontal machines. The lower-speed horizontal engines have a high thermodynamic efficiency, which is over 60 per cent in this plant, whereas the high vertical engines achieve little over 50 per cent. Another advantage of the horizontal type of machine is that the gas cylinder can be in tandem with the steam cylinder, giving a higher mechanical efficiency.

It was decided to use the vertical type only for methane and to install for cracker gas and ethylene a horizontal type of compressor. These machines develop about 530 h.p. each at 110 r.p.m. and the speed is automatically controlled by the suction gas pressure.

PYRIDINE SYNTHESES

Recent Research on the Homologues

IN the wide field of coal tar chemistry, pyridine and its homologues occupy an important place. One of the leading European researchers in this field, Prof. J. P. Wibaut, of Amsterdam University, recently reviewed the position reached in the study of pyridine, in a paper read before the Society of Industrial Chemistry.

Prof. Wibaut said that the discovery of pyridine homologues by Brutton and Bailey in 1936, opened up a further line of study. Wibaut and co-workers have lately investigated in detail some of the fractions, especially that of b.p. 129-264°C., and isolated a large number of compounds, including the three methyl-pyridine isomers, five dimethyl isomers, γ-ethyl pyridine, collidine and other homologues. In the fractions above 180°C., quinoline, isoquinoline, etc., were found. These homologues appear to be in much greater variety in petroleum fractions than in coal tar, and it is difficult to isolate the pure products. Some, however, can be synthesised, as has been shown by Wibaut, Hantzsch and Schering.

Alkyl Pyridines

Schering's method for the preparation of γ-ethyl pyridine did not prove very successful, but Wibaut and Arens claim better results with the alkyl pyridines, obtaining yields of 60 per cent with ethyl pyridine and good yields with propyl, butyl and the isoamyl homologues. When oxidised with permanganate, γ-ethyl pyridine gave a quantitative amount of iso-nicotinic acid. By applying the method to β-picoline, other pyridine homologues could be obtained. No process is known, however, for the synthesis of pyridine on a commercial scale. Following Berthelot's method for benzene from acetylene, an analagous but unsuccessful attempt has been made to prepare pyridine from a mixture of acetylene and gaseous HCN at a temperature of 600°C., using activated carbon as a catalyst. In the matter of substitutions there are marked differences between benzene and pyridine. For example, in nitration, sulphonation and halogenation. One nucleophile substitution occurs in pyridine which is of great interest. This is the reaction with sodium amide, to form the sodium salt of amino-pyridine, which can be readily nitrated or sulphonated. More important is the bromination, studied in detail by the author. The reaction takes place in the gaseous phase, with rigid temperature control and attention to the type of catalyst used. The bromopyridines react with magnesium to form, among other things, several pyridyl-carbinols, with yields up to 60 per cent. Some unstable γ-bromopyridine is also formed during bromination. This reaction with magnesium may also be applied to other halogen pyridines.

Lithium Derivatives

While these magnesium reactions have not yet been fully explained, those corresponding reactions with lithium appear to be more clearly understood. It is possible, using the method of Gilman (U.S.A.), to obtain pyridyl-lithium by reacting the bromopyridines with butyl-lithium in an ether solution at −35°C., and then to react the pyridyl-lithium with cyanpyridine, in similar fashion to the Blaise reaction with arylmagnesium bromide. By hydrolysing the ether solution pyridyl-ketone is obtained, and from this it is possible to prepare the tripyridyl-carbinol.

Further research undertaken, used picoyl-lithium to prepare a series of alkaloids (*punica granatum*), including pelletierine acetal. Dr. Wibaut here made reference to the work of Spielman and co-workers, but it appears that the American researchers were unable to isolate the racemic pelletierine itself, though isopelletierine was synthesised. Generally, it is easier to synthesise these products than to extract them pure from the plant.

Applications to Tobacco

These methods of synthesis have also been applied to the tobacco alkaloids and nicotine compounds, which the author described in some detail, in connection with the work of Spath, Kainrath and Pictet.

Finally, Dr. Wibaut described his research in connection with leucenol of *leucaena glauca B*, found to be identical with mimosine of *mimosa pudica*, which has recently been synthesised by Adams and Johnson in the U.S.A.

The Freezing Point of Uranium

It is reported from the U.S.A. that the National Bureau of Standards has established the freezing point of uranium as 1133° C., plus or minus 2°. The determination was carried out in a protective atmosphere of pure helium.

The Chemist's Bookshelf

INDUSTRIAL CHEMISTRY. E. R. Reigel. 1949. New York, Reinhold Publishing Corporation. London, Chapman & Hall. Pp. 1015. 56s.

This is the fifth edition of a work already well-established as a comprehensive account of the field of industrial chemistry. Professor Riegel has revised the entire treatment in this edition, and has endeavoured to bring the matter as up to date as possible. Because of this enhancement of the usefulness which characterised the previous book, the fifth edition can be regarded as an ambitious and possibly unique attempt to present the entire vista of industrial chemistry, with a good deal of care for the detail and mode of presentation.

That there should be omissions in a work which seeks to comprehend so huge a field in only one moderately sized volume is inevitable and such omissions as come to mind are in the fields most recently developed. For example, fluorocarbon chemistry is not mentioned; neither does the scope of the boron trifluoride derivatives, particularly as catalysts in organic chemistry, find a place in the book. It can be said, however, that the new edition is up to date as far as the more conventional topics of industrial chemistry is concerned; only where unusual or sudden advances have been made does it lag behind. Professor Riegel's account is in fact an excellent summary, very readable and made clear by some good photographs and diagrams. —P.M.

TABLET MAKING. Arthur Little and K. A. Mitchell. 1949. The Northern Publishing Co., Ltd., Liverpool; 15s.

Publications covering the making of tablets are so scanty that the issue of a text-book on the subject excites wide interest. So convenient is the tablet form for the presentation of medicaments that tablet manufacture is one of the fundamental operations in the pharmaceutical trade wherever westernised pharmacy has penetrated. The tablet also offers the advantage of a measured dose of medicament, important enough in respect of medicaments for self-administration, and is essential where the more toxic, ethical drugs are concerned.

While tabletting finds its main application in the medicinal field, the operation is not by any means confined to it. Its use in such cases as the manufacture of bath cubes, powder compacts, fertiliser tablets and home dyeing tablets is well-known. A further important application is in the manufacture of synthetic resin pellets and of powdered metal for powder metallurgy. These extra-pharmaceutical applications, however, receive scant attention from the authors.

This volume covers the whole field in a foreword, 17 chapters and miscellaneous pages; 119 pages in all. It is profusely illustrated, but the reproductions are mainly of the equipment of one manufacturer. This is not a serious defect, since this particular manufacturer dominates the field. One consequence, however, is that the important topics of tablet counting, bottle filling and packaging are dealt with inadequately. Similarly, the topic of air-conditioning in the manufacture of effervescent tablets (Chapter 13) receives little more than passing reference. Wet granulation techniques are extensively covered step-by-step; but the authors are either not familiar with or are disinterested in double compression or "slugging" methods which are cursorily dismissed in some three hundred words. The glossary is trivial and almost irrelevant.

The literature of tablet making and testing is considerable and widely dispersed in British, American and Continental journals. There is, however, not a single reference in the book or any attempt at a bibliography. It appears that the authors speak from practical but circumscribed personal experience and the usefulness of the book, practical as it is, is correspondingly diminished.

An extraordinary situation arises with regard to weight regulation. The authors rightly stress the importance of regulation and explain how tablets "accurate in weight" may be achieved by trial and error methods; but they fail to define their objective. That has been defined in the

seventh addendum to the British Pharmacopoeia, 1932 (" Tabellae," p. 36-38) and in the 1948 volume (pp. 516-519). With the best controlled gestation and delivery, tablets, like babies, will vary in weight round a mean; but in tablet production this weight variation must be confined within narrowly prescribed limits. The authors are of little help in this regard.

Notwithstanding its defects, the book should be widely read. It may even influence some hospital pharmacists to cease preparing those bullets which pass right through the gastro-intestinal tract. They can, if they try, find useful facts about disintegration here—but the index will not help them.—C.G.

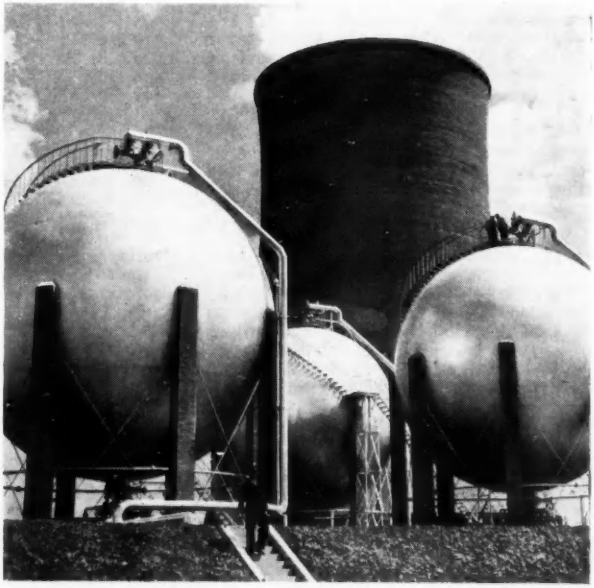
CELLULOSE ACETATE PLASTICS. Vivian Stannett. 1950. London: Temple Press, Ltd. Pp. 325. 30s.

In his preface, the author writes that " in spite of the tremendous interest shown in this material, no adequate book existed which embodied the simple facts about this plastic, its properties and techniques of handling." Thus, in a sentence, the scope and limitations of this book are succinctly defined.

It is claimed by the publishers that this book is the first to be devoted solely to cellulose acetate plastics and, this being the case, the book should meet a widespread demand. However, the author, in some instances, appears to have fallen between two stools. For example, in the appendices, he describes in some detail the methods of viscometry used to compare different ingredients. Although he explains that, in order to circumvent the mathematics concerned, only relative values are obtained, it would seem that to describe the measurement of viscosity, without explaining, or even defining, what viscosity is, can hardly be the best way of dealing with the subject. This is especially so here, since the book is intended to reach the average reader.

But it cannot be denied that this is a useful, as well as an attractive, book. The author has endeavoured to present his material in an interesting manner, and for those in the industry it can well be recommended as a comprehensive guide to the subject.—P.M.

New Engineering for Petroleum Chemicals



THE three spherical storage tanks, which have been erected on the site of Shell's new refinery at Stanlow, Ellesmere Port, are the first of this type to be supplied to an oil refinery in Britain. The tanks, designed and manufactured by Whessoe, Ltd., Darlington, measure 85 *ft. in diameter and each holds* 140,000 *gal. of butane gas stored at a working pressure of* 70 *p.s.i. In the background is the* 341 *ft. high concrete cooling tower, claimed to be the largest in the world*

Technical Publications

AN advanced laboratory apparatus for stirring, mixing and agitation is the new laboratory stirrer, designed by the Kestner Evaporator and Engineering Co., Ltd. This is described in leaflet No. 280. The stirrer, suitable for mounting on a standard retort stand and clamp, has a three-bladed propeller or interchangeable vortex impeller. The speed control regulator is a separate unit so that it can be placed conveniently near to the stirrer but away from fume, splash or heat. A utility model is also supplied which does not incorporate the drop-proof motor cover or special coupling.

* * *

APPLICATIONS of rubber to chemical plant in widely varying rôles are shown in text and illustrations of the current issue of "Torque" (Vol. 1, No. 5), development journal of Silentbloc, Ltd., and the Andre Rubber Co., Ltd., London.

* * *

SHAPING and forming of hot metals necessitates the use of materials that will give long service under arduous conditions. The characteristics of tool steel for this purpose and the effects of alloying elements are discussed by H. Carr, B.Sc. in an article in "Alloy Metals Review" (Vol. 8, No. 56) published by High Speed Steel Alloys, Ltd., Widnes, Lancashire.

* * *

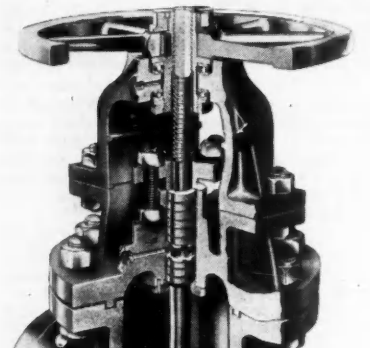
COMPREHENSIVE information on non-ferrous metals, tables of gauges, metric conversion tables, a ready reckoner and other useful facts are accumulated in the trade handbook of Charles Clifford & Son, Ltd., Birmingham, the tenth edition of which is now obtainable.

* * *

VIBRATING equipment for concrete consolidation, for research and experimental work on vibration phenomena, and various forms of solenoids are described by Westool, Ltd., St. Helen's, Auckland, Co. Durham, in its latest leaflets just issued.

* * *

WELDING in all its multiple applications is dealt with both seriously and humorously, with copious illustrations, in the "Stabilizer" (Vol. 18, No. 3) published by the Lincoln Electric Co., Cleveland, Ohio, U.S.A., and Lincoln Electric Co., Ltd., Welwyn Garden City, Herts, England.



[By courtesy of Metaducts, Ltd., Brentford

Example of the new range of outside rising screw valves for the petroleum and chemical industries now being sold under the trade name of Metastream. While satisfying the requirements of BSI 1414: 1949, head room required for the valve has been reduced to a minimum. The range of valves is, for the present, being limited to within the 6-in. size for pressure ratings up to those permitted by the Series 600 standards

* * *

ISOTOPES in industry were the subject of a week-end conference held recently at Birmingham, of which a complete account has been prepared by Mr. D. F. Bracher, secretary of the Atomic Scientists' Association. The first three lectures, "Basic Nuclear Physics" by Mr. W. J. B. Smith; "Methods of Detecting Radiation and Energetic Charged Particles," by Prof. P. B. Moon, and "Electronic Equipment and Counting Technique," by Mr. D. E. Bunyan, are reproduced in the current issue of the *Atomic Scientists' News* (Vol. 8, No. 6).

OVERSEAS CHEMISTRY AND INDUSTRY

NEEDS OF A CHEMICAL INDUSTRY

The Experience of Post-War Germany

TO emphasise the fundamental importance and value of chemical industry in promoting trade and stimulating business activity in other fields of national and international industry is the principal message of the July issue of *Chemische Industrie*, which is a special number of 216 editorial pages and more than 100 advertisement pages, with a complete and detailed "Where to Buy" index.

The generic title of the contents of this issue is "Was ein Chemiebetrieb Braucht" (What a Chemical Works Needs), and its scope is therefore wider than that of the well established theorem that the production of sulphuric acid in any country is an index of that country's industrial status and wellbeing.

B. Bickholt, of Frankfurt a/M, deals with the matter in some detail, with tabulated statistics of consumption of coal, electrical power, iron and steel, non-ferrous metals, and many other materials used in the chemical industry in Germany, furnishing ample evidence of its value as a trade promoter. Some figures for 1949 show that in coal consumption chemical industry took third place in western Germany with 4,778,000 tons, and in electrical power, it took first place with 5456 million kWh.

In consumption of non-ferrous metals in 1949 in western Germany, the chemical industry took third place, with 8 per cent of the total (rather a long way behind the consumption by the electrical and metal goods industries, with 24 per cent and 20 per cent respectively). Iron and steel for consumption in the chemical industry for general maintenance and repairs is estimated at 120,000-150,000 tons for the next few years, and capital requirements will probably take another 100,000 tons per annum.

In view of the wide and varied requirements of the chemical industry in plant, apparatus, and instruments, it is obvious that it is a very large consumer of glass, fine mechanical or precision goods, earths and minerals, packing materials, optical goods, paints and varnishes, and much else. It is estimated that in Western Germany the annual expenditure for coal and electrical power amounts to Dm. 500 million in the chemical fields alone; for non-ferrous metals, wood, textiles, glass, leather, cellulose and paper, a total of Dm. 200 million; and for iron and steel and general plant and apparatus Dm.600-800 million.

Of the total gross value of chemical production before the war—for the whole of Germany—averaging about Dm. 4-5000 million, about 40 per cent represented cost of raw materials and auxiliary materials (semi-manufactured, etc.), 10-15 per cent new apparatus, plant and repairs, and 10 per cent for packing and miscellaneous purposes.

Dutch Concern over German Competition

MANY Dutch chemical firms are concerned at the intensifying German competition, though the pace of Dutch expansion has so far been little affected. The Royal Sulphuric Acid Company, at Ketjen, reports that sales of potassium permanganate in Western Germany are being challenged by price cutting from Eastern Germany, where a factory was recently put into operation. A new line of production of this firm is saccharin. A well known pigment firm of Maastricht is also complaining of heavy German competition in the export markets.

Because of extensive home demands for oxygen, Electro Zum-en Waterstof, Ltd., of Amsterdam, has concluded a contract with the State mines of Limburg, to dispose of the mines' redundant oxygen supplies. The company points out that all international carbide producers are now working on a normal basis. Thus, because competition has become strong, the company prefers to process the more promising derivatives of carbide. A new factory for the production of acetic acid, acetaldehyde, vinyl acetate, solvents, etc., will soon be in operation. The Algemene Kunstzijde Unie, of Arnhem, is erecting a factory at Emmen, to produce Enkalon, a fully synthetic fibre akin to nylon. The stock material for the synthesis will be supplied by the State mines.

Because of overwhelming domestic demands, Holland has lately been unable to export sulphuric acid.

Chemicals for South African Industries

£8m. Expansion Programme of A.E. and C.I.

THE £8 million expansion programme of African Explosives and Chemical Industries to meet the varied industrial needs of the Union is now being actively implemented. Of interest to the gold mining industry is the extension of the company's calcium cyanide factory at Klipspruit. New plant to raise the production of ammonia by 32,500 short tons to nearly 60,000 tons a year is being provided at Modderfontein, where the existing plant is producing about 26,000 tons a year. A proportion of the increased output will be absorbed by the manufacture of explosives, which is rising steadily and is expected to reach four million cases of 50 lb. each by 1953. Part of the production will also go towards the manufacture of mixed fertilisers.

The survey, clearing and preparation of the site for the new factory are making rapid progress and orders have already been placed for the main items of the plant, where possible, to be made in South Africa. The large carbon dioxide removal towers, built to withstand pressures of 50 atmospheres, as well as the pressure storage vessels for anhydrous ammonia, will be supplied by the Vanderbijl Engineering Corporation, Vereeniging, while the gas plant will also largely be made in South Africa to overseas designs.

* * *

Basic oil will shortly be refined into lubricating oil in Durban for what is thought to be the first time in South Africa. The refining is to be done by a local firm which up to now has been re-refining lubricating oil already processed. Only small amounts would be dealt with until the arrival of new machinery.

* * *

The Industrial Development Corporation has now taken the lead in the oil-from-coal plans. The Anglo-Transvaal Corporation invested some £400,000 in pioneering outlay, but found that the enterprise was too big for a single company without Government assistance. No support was forthcoming from the powerful private interests engaged in the sale of petroleum products, their attitude, in fact, being discouraging. To bring the oil-from-coal scheme in South Africa to fruition the I.D.C. has now been authorised to raise Government-guaranteed loans, some of which may come from the U.S.A.

Tinted aluminium foil to provide a decorative and protective wrapping is now being made in South Africa by a Germiston firm from raw material supplied by the Aluminium Co. of South Africa, Ltd., Pietermaritzburg.

* * *

Considerable advance in the technique of producing thin wall thermo-setting mouldings for plastics is claimed by Rhodesia Plastics, Ltd., Salisbury, Southern Rhodesia. One of the main applications of these thermo-setting mouldings has been to pharmaceutical and cosmetic containers. A notable example is a cream jar with flush side fitting lid. The two sections forming the inner and outer layers of the jar are moulded in one piece.

The Asbestos "Boom"

AS a commercial product today, either in a buyers' or sellers' market, asbestos is proving a steadily marketable commodity and, as a result, the industry is experiencing the greatest boom ever known in its long history, writes W. E. Sinclair in the *South African Mining and Engineering Journal* (61, 567). He foresees the possibility of asbestos being displaced by one or two more substitutes which might be produced more cheaply and considers that, but for that, substantial increases would have occurred in asbestos prices.

The present development of deposits and of ore dressing, he suggests, are not sufficiently well organised to ensure continuing returns at economic costs.

New Petroleum Catalyst

A NEW industry for the production of a special catalyst substance, previously manufactured only in the United States, which will help increase the yield of high grade petrol from crude oil in this country, is to be founded at Warrington. The industry is expected to find employment for about 250 operatives. The catalyst, a fine grain material, will be produced in part of the Warrington works of Joseph Crosfield and Sons, Ltd. In the traditional oil cracking process relying only on heat and pressure, 30 per cent petrol was commonly obtained. The new catalyst is stated to facilitate yields of up to 50 per cent.

THE UGANDA PHOSPHATE DEPOSIT

Fuller Development Expected

THE recent development at Tororo, near the eastern boundary of Uganda and the Kenya-Uganda railway, of a large deposit of phosphate has derived interest from the general phosphate deficiency of East and Central African soils and the relatively high cost of the imported material.

The mine, lying a little south of Mount Elgon, is being worked in a primitive fashion today, but its fuller development is expected to follow the supply of cheap electric power from the Owen Falls dam, where hydro-electric plant is to be installed.

Primitive workings at Tororo

The mineral is a low grade phosphate, too insoluble to be used successfully as a fertiliser without treatment, although many tons have been used for that purpose in Kenya. It cannot be made into superphosphate because of its high iron content.

Heat Treatment

It has been found that the best treatment so far has been to raise the deposits to a high temperature in the presence of sodium carbonate, and this is being done in a small kiln in Nairobi. Sodaphosphate is the name which has been given to the product in Kenya, and local farmers have used it with very good results, although it is not as soluble as superphosphate. The difference in the price of the local product and that of imported superphosphate is acting as an effective incentive to farmers to use the local phosphates.

Sodium carbonate is also a local product, obtained from the Magadi Salt Lake 74 miles south-west of Nairobi. It is expected that the large-scale manufacture of the fertiliser will be sited somewhere between the phosphate and sodium supplies.

As is well known, Magadi Soda Lake, with its 10 ft. crust of raw sodium sesquicarbonate, is the largest single deposit in the world, covering an area of nearly 36 square miles. The Magadi Soda Co., Ltd., produces about 400 tons of anhydrous carbonate of soda daily at present, and the plant is constantly being increased.

Improving Oil Extraction Methods in Ceylon

THE Government of Ceylon is to establish in about 12 months a vegetable oil factory for the manufacture of processed products from coconuts and for the extraction of oil from seeds and from the residues left by relatively inefficient local processing. Private investors foreign and local, will be invited to contribute up to 49 per cent of the capital and the undertaking will be run as a national corporation.

The factory will occupy a 27-acre site at Seeduwa, the centre of the coconut milling industry, and will cost Rs. 12 million. The construction and equipping of the factory has been entrusted to Bamag, Ltd., London, whose managing director, Colonel M. A. McEvoy, is now in Ceylon to supervise operations.

At present much coconut oil is expressed from copra by methods which leave 10 to 22 per cent of the oil in the residual poonac. The factory is to buy this poonac from the millers and take more oil from it by solvent extraction, leaving only 1 per cent in the residue. What is left will be compounded with fish meal, molasses and rice bran to form a very valuable cattle food. The crude oil obtained will be converted partly into glycerin and partly into distilled fatty acids for the soap and rubber industries. The factory will also manufacture edible oils, and extract non-edible oil from rubber seed.

WORLD SOURCES OF MANGANESE

U.S. Survey of Changing Pattern of Production

DIMINISHED supplies of manganese in the preceding year made 1949 a critical period for the United States steel industry, which was faced with the serious prospect of curtailed steel production.

Under present technology, the use of manganese, one of the most important strategic materials, is indispensable in the production of steel, the bulk of the world's output being used in that industry.

The American supply position in manganese ore was, however, greatly improved during 1949. Total imports rose from 1,124,000 long tons in the previous year to 1,379,000 tons in 1949, an increase of nearly 23 per cent.

This increase is significant in that the U.S.S.R., which supplied 385,000 tons in 1948, or roughly 34 per cent of the total for that year, accounted for only 73,000 tons in 1949.

Virtual cessation of Russian manganese shipments was offset by an acceleration of imports from India, the Union of South Africa, and the Gold Coast.

These facts are recalled by Louis A. Cassara, metals and minerals branch, commodities division, Office of International Trade. (*Foreign Commerce Weekly* (Vol. 39, No. 5)).

Of the major steel-producing countries, only Russia has within its national boundaries sufficient manganese ore to supply its needs.

Although large quantities of low-grade manganiferous ores are found there, the U.S.A. is almost completely dependent upon foreign sources of supply to meet its domestic requirements for high-grade manganese ore, and the continued availability of this strategic commodity is evident.

Factors Governing Shortage

Many factors contributed to the shortage in 1948—recalls the *Foreign Commerce Weekly* article—among them being transport problems in South Africa, and unsettled political conditions that followed partition in India. Cuban production declined because of high labour costs, while most of the output from the Gold Coast went to the U.K., Canada and Norway.

As a result of the large increase in steel production, the U.S. share of total world manganese imports rose from 29 per cent in 1937 to 66 per cent in 1947.

During the war, the U.S. doubled its imports of manganese, in comparison with pre-war totals, despite the fact that there were no imports from Russia. Increases in imports from Brazil, India, and Cuba offset the loss of Russian shipments. Although Gold Coast production was high, most of the ore mined went to the United Kingdom to support that nation's industrial mobilisation.

A significant development of this period was the beginning of manganese trade between the Union of South Africa and the U.S. Imports from this source, which were negligible in 1939, rose to 238,000 tons in 1940.

South African Supply Source

Throughout the war most of the manganese mined in South Africa was shipped to the U.S.A. To-day the Union is its second most important source of supply. It provided 316,000 tons in 1949, against 194,000 tons the previous year.

Manganese exports from South Africa to all countries reached 680,000 tons in 1949, more than double the quantity exported in 1948.

More than 27 per cent of the U.S. manganese imports in 1949 came from India, now the principal source of supply. By the end of the year imports from this source were at an annual rate of nearly 500,000 tons.

Most of the obstacles that hampered exports from India have been eliminated, and in order to realise maximum dollar earnings for manganese the Government has, since devaluation, tried to raise the rupee selling price of the ore to restore the dollar prices to the level prevailing prior to devaluation.

Although there was a slight increase in imports from Brazil in 1949, the quantity was less than anticipated. Nearly all of Brazil's manganese production is exported to the U.S.A. Developments in Brazil point to the likelihood of that country becoming the most important source of supply for manganese for the U.S.

Imports from the Belgian Congo, which amounted to less than 3000 tons in 1949, may increase if plans materialise to exploit the deposits in the Malonga area.

Increases may also be expected from Angola, where a new company has recently been formed to exploit that country's manganese deposits.

OVERSEAS

New French Detergent Factory

A Paris report announces that the Société des Produits Chimiques de Shell-Saint-Gobain is to build a large synthetic detergent factory at Rouen, similar to those already existing in Holland and Great Britain.

U.S. Sugar Substitute for Ireland

A new medical preparation expected to be on sale in Ireland shortly is Sacrocyl, made by Abbotts, of Chicago. The preparation is stated to be 30 times sweeter than sugar, and does not break down under cooking. It is indicated for diabetes.

Power Alcohol Mixture Prohibited

The Chief Commissioner of Delhi, India, has temporarily prohibited the mixing of power alcohol with motor spirit. The mixture, it is alleged, reduces mileages per gallon by about 30 per cent, unless the engine is adjusted, and by about 20 per cent with changed jet and ignition. Power alcohol is said to produce increased cylinder wear.

New Ownership of U.S. Company

The M. W. Kellogg Company, refinery and chemical engineers of Jersey City and New York, announced last week that the company had sold the stock and assets of one of its subsidiaries—the Kellex Corporation—to the Vitro Manufacturing Company. This implements the Kellogg policy of concentrating its commercial development, engineering and manufacturing efforts in the petroleum, chemical and power fields.

More U.S. Titanium Pigments

Titanium pigments for paints, at the rate of 60,000 to 70,000 tons annually, will be produced in a new plant at St. Louis, Missouri, which is being erected there by the National Lead Company. Production is expected to start within a year with the plant achieving full production in about 18 months. Producers of titanium pigments have been under considerable pressure in recent months to meet all demands, particularly for titanium dioxide.

Australia to Double Steel Output

Doubling of Australia's steel output is proposed under an expansion scheme recently announced by Australian Iron & Steel Ltd., the largest operating subsidiary of Broken Hill Pty., Ltd. The capital of this company is to be increased from £A8.5 million to £A20 million. The project includes erection of a hot strip mill, a cold strip mill and a plant at Port Kembla for making tinplate, the only major steel product not now produced in Australia.

China's Chemical Programme

The Chinese government is reported to have a plan for a centralised industry to produce not less than 20 million tons of fertilisers yearly, dyestuffs and cement. Plants and hydro-electric generators in the N.-East are to be constructed on the banks of the Yangtze.

Radioactive Isotopes in U.S. Petrol Research

It is reported from the U.S.A. that a new radio-chemical laboratory will be completed at Bartlesville petroleum experimental station, Oklahoma, by September. The laboratory is to be used for the investigation with radioactive isotopes of the secondary recovery of mineral petroleum by water flooding and the injection of gas and air.

New Grade of Carbon Black

The grade of carbon black recently developed in the U.S.A. by the Phillips Petroleum Company, Bartlesville, Oklahoma, called SAF black, is expected, when used with "cold" rubber, to produce tyre treads having 25 to 50 per cent better wear resistance. It is produced from oil by a continuous process and trial quantities are now being distributed to U.S. industries.

India to Process Monazite

India is to make profitable use of the monazite deposits in Travancore in a processing plant, expected to produce thorium and uranium, on which work has started at Alwaye as a joint enterprise of the Governments of India and of Travancore-Cochin. It may be in production in six to eight months. The estimated cost, about Rs. 1 crore, will be shared by the two governments in the ratio of 55 per cent (India) and 45 per cent.

Disposal of German-Italian Works

The Allied Commission for the administration of private property in Italy has recently sold by auction the Gubra chemical works at Desio near Milan. The plant is reported to be in good condition and to have been acquired by a group of local industrialists. The German participation in the Societa Italiana del Litopone, Milan, a company associated with the Montecatini group, has also been offered for sale.

· PERSONAL ·

SIR WILLIAM J. LARKE, K.B.E., was re-elected as president of the British Welding Research Association at the annual general meeting on July 13. SIR CHARLES S. LILLICRAP, K.C.B., who is director of naval construction at the Admiralty, was elected chairman, and SIR STANLEY GOODALL, who resigned the chairmanship owing to ill-health, now holds the office of vice-chairman.

SIR JOHN ANDERSON was elected president for the ensuing year of the British Standards Institution at its annual general meeting last week.

MR. R. J. SMITH, formerly head of the cotton section of the dyehouse department, Imperial Chemical Industries, Ltd., Blackley, has been appointed an assistant chief colourist.

DR. D. M. MORRISON, of Montreal, is the new chairman of the board of the Chemical Institute of Canada. Mr. Garnet T. Page, Ottawa, continues to serve as general manager.

Dr. James H. Lum, managing director of Monsanto Chemicals (Australia), Ltd., has announced the appointment of MR. T. G. CRANE as deputy managing director of the Australian company. Mr. Crane is expected to go to Melbourne early in 1951. He joined Monsanto Chemicals, Ltd., nearly 18 years ago as an assistant plant chemist in the rubber chemicals section of the Ruabon works. He has been manager of the technical sales department for some time and has been in close touch with the markets for the new products coming from the recently constructed works at Newport, Mon.

DR. C. SYKES, director of research of the Brown-Firth research laboratories, has retired from the chairmanship of the divisional panel of the metallurgy division of the British Iron and Steel Research Assocation, and has been succeeded by MR. W. BARR, chief metallurgist of Colvilles, Ltd. MR. G. H. JOHNSON, managing director of the Kettering Iron & Coal Co., Ltd., has retired from the chairmanship of the divisional panel of the association's iron making division and MR. W. C. BELL, joint director of research of Stewarts & Lloyds, Ltd., has accepted the chairmanship. Mr. Johnson will be deputy chairman.

MR. B. J. HAILL, production superintendent of the Dunlopillo division at the Dunlop Rubber Company's Walton factory, has been appointed works manager of the new factory on the Hirwaun Trading Estate in South Wales. He is succeeded at Walton by MR. A. TAYLOR, previously his assistant.

PROFESSOR P. M. S. BLACKETT, Longworthy professor of physics, Manchester University, was among the British scientists to be awarded corresponding membership of the east German Academy of Sciences. The occasion was the 250th anniversary of the former German academy of sciences, the work of which the east German academy claims to continue.

MR. R. P. GRUNDY has joined the staff of Triplex (Northern), Ltd., St. Helens, Lancs., as technical assistant to MR. H. IRWIN, director and general manager.

MR. CHARLES J. HOLLAND MORITZ, former vice-president of the Aluminum Company of America, who died in Boston, Mass., in 1948, left estate of the gross value of $2,519,226.

Obituary

Deep regret was occasioned by the news that MAJOR E. F. CAMPBELL, widely known here and overseas as an expert adviser on chemical apparatus, had been killed in a motor accident on July 6 during a holiday in Scotland. Major Campbell was principally associated as a technical specialist with the Walthamstow branch of Baird & Tatlock (London), Ltd., of which he was a director, and had made several visits to India on the company's behalf.

The death has occurred of MR. N. GUNN, secretary and a director of Mullard Electronic Products, Ltd., and of its associated companies. He had been connected with the Mullard organisation since 1920.

BETRO's Future

If Britain is to maintain her export drive "hit-and-miss" methods of trading must be abandoned, declared Mr. Leslie Gamage, chairman, at the annual meeting in London of the British Export Trade Research Organisation. It had been decided that in future BETRO should stand on its own feet without Government assistance.

HOME

Fractured Flywheel

When the 5-ft. flywheel of an engine at Ribble Paper Mills, Walton-le-Dale, Preston, burst on July 12, a 2-cwt. piece of steel flew through the roof of the single-storey shed and landed in the yard of a house 100 yards away. In its flight it glanced off the roof of a house, bringing down part of the roof, a bedroom window, and a portion of the wall.

New Steel Prices

Maximum prices of a limited range of iron and steel products, mainly those affected by the recent increase in the price of nickel, are amended under a new Ministry of Supply order, Iron and Steel Prices (No. 2) Order, 1950, which operates from July 17. The chief alterations are in the prices of alloy steel billets according to quality; the order also increases the prices of other alloy and stainless steel products.

Ambulance Team's Successes

A team from I.C.I., Ltd., Runcorn, won the two-men ambulance competition at the National Fire Tournament, at Eastbourne on July 12. They scored 52 out of 66 points. On July 11 the team won the senior one-man ambulance contest and on July 13, a team won the four-men ambulance event in the final contests. They have won three of the four ambulance competitions.

White Oxide of Antimony

A further reduction in price of Cookson's white oxide of antimony was announced this week by the Associated Lead Manufacturers, Ltd. Costs of the Red Star grade range from £131 10s. for lots of 100-tons to £136 for lots of 5-cwt. Green Star prices are £3 per ton less and White Star £3 per ton more. Reduction has been made possible by a somewhat lower cost of raw materials. The pigment is now being exported to the U.S.A.

Zinc Premiums Raised

Premiums for 99.99 per cent refined and electrolytic zinc were this week increased as follows: Refined and electrolytic zinc, £4 10s. (old premium 15s.); not less than 99.99 per cent purity, £10 10s. (old premium £2 5s.). The price of g.o.b., Prime Western and debased is unchanged. The prices of zinc metal sold by the Ministry of Supply a long ton delivered buyer's premises are therefore: G.O.B., Prime Western and debased, £127 10s.; refined and electrolytic, £132; not less than 99.99 per cent purity, £138.

Terylene Net for 14th Century Garment

The newest textile material, Terylene, dyed by I.C.I., Ltd., to match the ground colour of the garment, was used as a protective netting to preserve the jupon of the Black Prince, which has been hanging in Canterbury Cathedral since 1376.

Lead Price Twice Raised

The price of good soft pig lead was increased twice last week following rises in American and Canadian quotations. The first increase on July 13 was by £4 from £88 to £92 a ton. The second the following day by a similar amount brought the price up to £96 a ton, thus restoring the two cuts made at the end of June.

Strikes Affect Coal Output

Production of coal in the U.K. in the week end July 15 totalled 3,897,500 tons, of which 277,900 tons were opencast, compared with 4,004,700 tons the week before. The reduction in output of 127,200 tons through disputes was mainly due to Scottish strikes, though recognised holidays accounted for 333,400 tons.

Drugs Should be Free for All

Representatives of the British Medical Association, at their annual meeting, unanimously supported Dr. H. H. Goodman's motion calling for free medicine and appliances for private patients. Dr. Goodman said that these patients probably paid more than others in general taxation and should have the advantages of free drugs for which they had contributed.

Widening Programme of Laporte

The rapidly expanding research and production programme of Laporte Chemicals, Ltd., was described by Mr. L. P. O'Brien, chairman, at the 43rd annual general meeting of the company held last week at Luton. An increase in research staff during recent years had been amply justified, he said, and the laboratories built in 1936 were now quite inadequate. During the next few years additional laboratory accommodation costing £50,000 was to be built at Luton, also a new experimental plant house for developing new processes. National Titanium Pigments was building bigger and better designed plant to be known as Battery Works, Stallingborough, North Lincolnshire, which will cost £1.5 million over the next few years. New hydrogen peroxide plant was now coming into successful operation and would help to keep prices as low as possible.

The Stock and Chemical Markets

BUSINESS has remained very limited because of the news from Korea, and most movements were small and indefinite. A small rally in British Funds, however, helped the general undertone. The Korean developments have not led to any heavy selling and this is now tending to hold sentiment, although buyers are extremely cautious. In fact, quotations for many smaller priced industrial shares have not been adequately tested by dealings in recent weeks.

Chemical shares again remained relatively steady with Imperial Chemical at 40s., Laporte Chemicals 5s. units 10s. 4½d., and Fisons slightly easier at 25s. 6d., at which there is a generous yield, provided that the estimated 9 per cent dividend is forthcoming. Monsanto kept at 49s. 6d. and British Glues & Chemicals 4s. units have remained firm at 21s. 9d., on expectations that the results will create a good impression. Lever & Unilever, however, receded further to 38s. 3d. awaiting the annual meeting. This may provide news of the company's new capital requirements, which, it is suggested, may amount to over £10 million, partly because of the bigger stocks to be financed following the end of soap rationing. Prevalent belief is that in any issue of capital, which would probably be in debentures or some other form of prior charge, stockholders would be offered preferential terms of allotment.

Albright & Wilson have further strengthened to 29s. 3d., another case where more capital will soon be required, and where the market assumes that shareholders would probably have allotment on preferential terms. Boake Roberts were 26s. 6d., Bowman Chemical 4s. shares 5s. 3d., F. W. Berk 10s. 3d., " ex " bonus, Amber Chemical 2s. shares 3s., while Brotherton 10s. shares kept at 20s. and Pest Control were 7s. 6d. Woolley 4¾ per cent debentures, in which dealings started recently, were 104½. W. J. Bush ordinary shares remained firmly held and quoted at 72s. 6d., following publication of the results, L. B. Holliday 4½ per cent preference kept at 19s. 6d., and British Chemical & Biologicals 4 per cent preference were 17s.

There has again been activity in the 4s. units of the Distillers Co. around 18s., on market expectations of good financial results. Estimates of the dividend on the capital, increased by the 50 per cent share bonus, range up to 20 per cent. Turner & Newall eased to 81s., United Molasses to 41s. 6d., but Borax Consolidated deferred at 54s. 6d. were steady, although British Oxygen eased to 95s. following news of the explosion at one of the company's factories. Glaxo Laboratories 10s. units changed hands actively around 46s. 6d., British Drug Houses 5s. shares were 7s. and Boots Drug, at 46s. 3d., held part of an earlier improvement. British Match at 34s. 3d. were lower, following publication of the results and the chairman's reference to the extremely large proportion of the group's earnings absorbed by taxation. Paint shares also turned easier with Lewis Berger at 27s. 9d. and Pinchin Johnson at 39s. 10½d; profit-taking following publication of the financial results.

There was some selling of oil shares which once again showed the effect of international news. Anglo-Iranian were down to £5¾ and Shell to 60s. 7½d.

Market Reports

DESPITE the approach of the holiday season, trading conditions on the industrial chemicals market have remained fairly active with rather more interest in forward business. Inquiries for shipment have been on a good scale and have covered a wide range of materials. The general run of the soda and potash products have all been in good request while formaldehyde, arsenic and hydrogen peroxide are moving well. A fairly active demand for solvents has been reported as well as for paint raw materials. Price changes have been comparatively few but fluctuations in the price of lead have necessitated adjustments in the Convention quotations for white lead and red lead. The basis prices for these are now £124 per ton and £114 10s. per ton. An active interest is maintained in the coal tar products market, with most items in steady request. Pitch, creosote oil and phenol are particularly noted and a good demand continues for the light distillates.

MANCHESTER.—The outstanding price movements on the Manchester chemical market during the past week have been renewed advances in the lead compounds following upon the easiness which developed recently. Otherwise the market as a whole has continued steady to firm. Holidays are still affecting to some extent the movement of supplies of the alkalis and other leading products into home consumption, but, apart from this, trade is on steady lines, with a fair volume of new

(*continued on page* 142)

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ALLIED GUANO & CHEMICAL CO., LTD., London, E.C. (M., 22/7/50.) June 14, charge, to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; charged on Westwood, 9 Elgin Road, Talbot Wood, Bournemouth. *£7000. June 15, 1949.

BURTON, RHODES & CO., LTD., London, W., manufacturers of polishes, etc. (M., 22/7/50.) June 9, charge, to National Provincial Bank, Ltd., securing all moneys due or to become due to the bank; charged on certain moneys payable to company under a policy of assurance. *Nil. Nov. 4, 1948.

Satisfaction

A. P. V. CO., LTD. (formerly ALUMINIUM PLANT & VESSEL CO., LTD.), London, S.W. (M.S., 22/7/50.) Satisfaction June 21, of charge registered January 25, 1921.

Receivership

CHEMO-PLASTICS, LTD., Wrecclesham Factory, Portsmouth Road, Farnham. (R., 22/7/50.) Mr. D. R. Clack, Adelaide House, King William Street, E.C.4, was appointed receiver and manager on June 22, 1950, under powers contained in debentures dated November 12 and December 10, 1948.

Company News

"Francolor"

The report for 1949 of S.A. de Matières Colorantes et Produits Chimiques "Francolor"—the first to be issued since the company's formation during the German occupation of France—reveals a net profit of Fr. 506 million compared with Fr. 319 million in 1948. Sales in 1949 were valued at Fr. 10,856 million (1948 value Fr. 10,542 million), of which Fr. 3493 million (Fr. 3013 million in 1948) were accounted for by exports to foreign countries and to French colonies.

William Neill & Sons (St. Helens)

The net profits of William Neill and Son (St. Helens) to March 31, 1950 totalled £81,147, an increase of nearly £7000 over the previous year. Dividend of 8d. per share is being made on 2s. ordinary shares (£18,333) compared with 6d. per share (£11,000) last year.

New Registrations

Cromil, Ltd.

Private company. (454,154). Capital £100. Manufacturers of soaps, polishes, solvents, cleansing and lubricating agents, chemicals, etc. Directors: R. A. Millard, C. G. Crowley. Reg. office: Commercial Union Chambers, 200 Wolverhampton Street, Dudley.

"Devon" Soaps, Ltd.

Private company. (484,316). Capital £100. Manufacturers of soaps, soap extracts, washing materials, etc. Directors: W. R. Fenton, B. Fenton and T. R. Fenton. Reg. office: Hilderthorpe Terrace, Garforth, Leeds.

Victoria Laboratories, Ltd.

Private company. (484,225). Capital £1000. Research and experimental work connected with chemicals, metals, minerals, etc. Directors: Prof. W. H. Linnell, F. G. Hobart, M. N. Freedman. Reg. office: 9 Arundel Street, Strand, W.C.2.

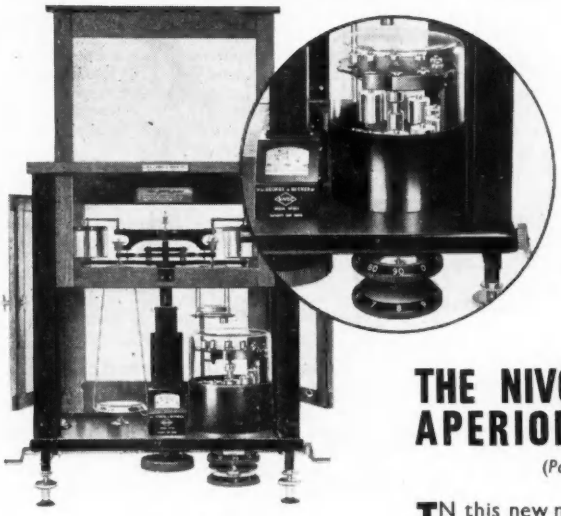
THE STOCK AND CHEMICAL MARKETS

(*continued from page* 140)

business reported. A moderate aggregate trade is passing in the fertiliser section at the higher level of prices. In the tar products market there is a steady demand for most lines, including the light distillates.

GLASGOW.—Business in the Scottish heavy chemical market has been extremely quiet this week due to the Glasgow Fair holidays. Export business continues to show activity.

An entirely New Principle



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IN this new model the required weights are selected by manipulation of two controls, calibrated 0-9 gms. and 0-90 gms. When the beam is released the pre-selected weights are transferred to, and automatically centred on two stools which take the place of the weighing pan. All the other well-known labour saving features of the Nivoc range of Aperiodic Balances are incorporated in this latest model. An illustrated leaflet (P.1924) describing this balance which has a Maximum Capacity of 200 grammes and is sensitive to 0.1 milligramme, will be sent upon request.

Only 2 weights,
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ALUMINIUM FOIL

Scottish Enterprise in Ceylon

THE Achme Aluminium Co., Ltd., recently established in Colombo, has begun the production of aluminium foil linings for tea and desiccated coconut chests. When in full production it is expected to meet the Island's entire demand for aluminium foil linings. The price of the local product is slightly less than that of the imported linings. Production costs are likely to diminish.

This new industry comes from the enterprise of the Empire Aluminium Company, of Scotland, which in February last year sought Government sanction and assistance to establish an aluminium foil rolling factory in Ceylon. They pointed out that present imports were from Scotland, Sweden and Canada, and asked for certain concessions. Last June, concessions were granted in respect of import duty on machinery, paper for lining, and bulk aluminium consignments. The capitalised value of the company is Rs. 700,000.

New Form of Borax

A NEW borax product, available in free-flowing fine granular form, is announced by Borax Consolidated, Ltd., London. The new product, Neobor, is stable under normal atmospheric temperatures and pressures, but contains only five instead of the 10 molecules of water present in ordinary borax.

The new product is guaranteed at least 99.5 per cent pure. Typical analyses show the following comparisons between Neobor (penta-hydrate) and ordinary borax (deca-hydrate): Boric oxide (B_2O_3) 48.3 (ordinary grade 36.5) per cent, sodium oxide (Na_2O) 21.5 (16.3) per cent; water (H_2O) 30.2 (47.2) per cent.

Scope and use of the new material may be found in all industrial processes in which ordinary borax is now employed. These can be divided roughly into two categories, those requiring the borax to dissolve in water, and those involving fusion when the escape of the water of crystallisation imparts a stirring action to the furnace charge. In this respect, Neobor is superior to the anhydrous borax which is slower in dissolving in water and does not agitate the melt during fusion.

Neobor fuses at temperatures below 200° C. without the customary excessive puffing and frothing.

GAS TURBINE SCHOOL

Reopening in October

THE Farnborough school of gas turbine technology—the only one of its kind in the world—is reopening at Farnborough Place in October.

Because of expansion, the school, maintained by Power Jets (Research & Development), Ltd., has been moved from its old premises at Lutterworth where some of the earliest jet engines were designed and tested.

Founded in 1944 to instruct Dominions' Air Force personnel in aircraft jet engines, the school now gives instruction in the manifold uses of gas turbines. It has a wide range of equipment and engines, including test houses and a jet aircraft on which installation and practical ground instruction is given. There will be four types of courses, one for overseas engineers.

German Pharmaceuticals

A SURVEY of the pharmaceutical industry in Germany 1939-1945 is the subject of report No. 24 of the BIOS (British Intelligence Objectives Committee Surveys), the latest publication of the Technical Information and Documents Unit, Board of Trade. The survey (HMSO, 3s. 6d.) is edited by J. B. M. Coppock. He observes that the technique of German pharmaceutical manufacture during the period under review appeared to have been inferior to that of this country, but it would be dangerous to assume that it would remain so.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

A VACANCY exists in the **PROCESS DEVELOPMENT** Department of a firm engaged in the manufacture of organic chemicals and subsidiary products. Applicants should possess a Degree (or equivalent) in Chemistry and have had at least three years' experience in research and development. The salary scale is in the range £450-£750 per annum according to qualifications and experience. Generous non-contributory Staff Assurance Scheme. Apply to **Personnel Manager, Petrochemicals, Ltd., Partington Industrial Estate, Urmston, Manchester.**

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OIL REFINERY CONTRACTORS handling large contracts for refinery plant, require **CONTRACTS ENGINEERS** in their London office. Duties involve broad direction and co-ordination of all phases of the work, including planning, drafting, purchasing, progressing and erection. Desirable qualification is previous experience of refining industry or heavy engineering including a wide knowledge of pumping, heat-exchange equipment and instrumentation, and the appointment offers excellent prospects to suitable men. Applicants should write fully, stating qualifications, age and experience to **FOSTER WHEELER LTD., 3, Ixworth Place, London, S.W.3.**

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JOHNSON, Matthey & Co., Limited require **PROCESS RESEARCH CHEMISTS** of B.Sc. degree or equivalent standard, at their non-ferrous refineries near Enfield. Salary according to qualifications and experience. Applications with full particulars to the **Secretary, 73-83, Hatton Garden, E.C.1.**

THE Civil Service Commissioners invite applications for appointments as **SENIOR SCIENTIFIC OFFICER** and **SCIENTIFIC OFFICER** to be filled by competitive interview during 1950. Interviews began in January and will continue throughout the year, but a closing date for the receipt of applications earlier than December, 1950, may eventually be announced. Successful candidates may be appointed immediately. The posts are in various Government Departments and cover a wide range of scientific research and development in most of the major fields of fundamental and applied science. Candidates must have obtained a university Degree in a scientific subject (including engineering) or in mathematics with first or second class honours, or an equivalent qualification, or possess high professional attainments. Candidates for Senior Scientific Officer posts must, in addition, have had at least three years' post-graduate or other approved experience. Candidates for Scientific Officer posts taking their Degrees in 1950 may be admitted to compete before the result of their Degree examination is known.

Age limits: For Senior Scientific Officers, at least 26 and under 31 on 1st August, 1950; for Scientific Officers, at least 21 and under 28 (or under 31 for established Civil Servants of the Experimental Officer class) on 1st August, 1950. Salary scales for men in London, Senior Scientific Officers, £700×25—£900; Scientific Officers, £400×25—£650. Rates for women somewhat lower.

Further particulars from the **Secretary, Civil Service Commission (Scientific Branch), 7th Floor, Trinidad House, Old Burlington Street, London, W.1**, quoting No. 2887.
6773/200/JH.

THE Civil Service Commissioners invite applications for permanent appointments as **ASSISTANT EXPERIMENTAL OFFICER** to be filled by competitive interview during 1950. Interviews will be held throughout the year, but a closing date for the receipt of applications earlier than December, 1950, may eventually be announced either for the competition as a whole or in one or more subjects. Successful candidates may expect early appointments.

The posts are in various Government Departments and cover a wide variety of scientific (including engineering) qualifications. Places of work are spread throughout Great Britain.

Candidates must be at least 17½ years and under 26 years of age, or under 31 for established Civil Servants of the Assistant (Scientific) Class on 1st August, 1950; time spent on a regular engagement in H.M. Forces may be deducted from actual age. Candidates must have obtained the Higher School Certificate with mathematics or a science subject as a principal subject, or an equivalent qualification; but candidates without such qualifications may be admitted exceptionally on evidence of suitable experience. Higher qualifications will be regarded as an advantage to candidates over the age of 20.

The inclusive London salary scale (men) is £230-£490. Salaries for women and for posts in the provinces are somewhat lower. Superannuation provision is made under the Superannuation Act.

Further particulars and forms of application from the **Secretary, Civil Service Commission, Scientific Branch, 7th Floor, Trinidad House, Old Burlington Street, London, W.1**, quoting No. 3068. Completed application forms should be returned as soon as possible.
6742/250/DBL.

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TECHNOLOGIST required in East Africa with good practical experience of the china clay industry. Should be competent to carry out all necessary testing work to control processes and be well versed in the characteristics required in the finished products. Salary according to experience and suitability. Prospects are good for candidate with the necessary qualifications and experience. Married quarters provided. Write **Box 3568 c/o Charles Barker & Sons, Ltd., 31, Budge Row, London, E.C.4.**

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No. 210 One **HORIZONTAL MIXER** as above.

No. 211 One **HORIZONTAL MIXER** as above.

These three "U"-shaped mixers are in some cases fitted with steel plate covers and a steam jacket round the bottom and extending to within about 18 in. of the top with plain end plates.

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